

Machine and Tool BLUE BOOK

A DIGEST OF THE METAL WORKING INDUSTRY

JUNE 1947

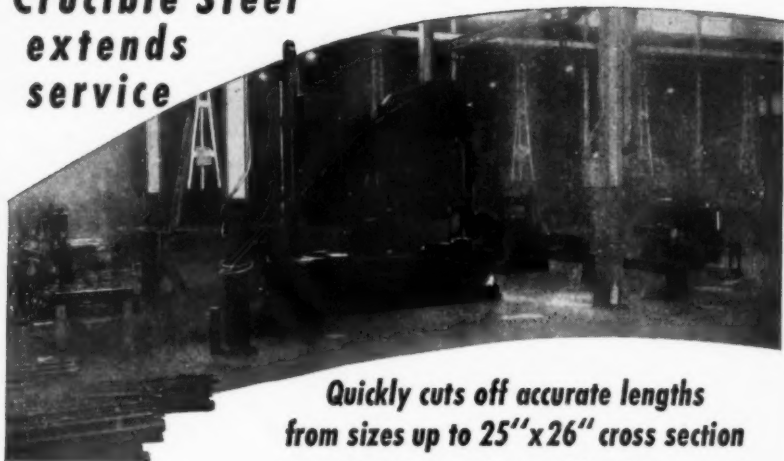
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A HITCHCOCK PUBLICATION

Crucible Steel extends service



Quickly cuts off accurate lengths from sizes up to 25" x 26" cross section

No. 24 MARVEL giant Hydraulic Hack Saw. (capacity 24" x 24"). Employs new "Roll Stroke" sawing action and trouble-free low pressure hydraulic control.

No. 9A MARVEL Production Saw (capacity 10" x 10"). Automatically feeds, measures and cuts-off identical lengths from single or nested bars with no more operator attention than an automatic screw machine.

No. 6 MARVEL Saw (capacity 6" x 6"). A high-speed, heavy-duty, all-ball-bearing saw—operates up to 149 strokes per minute, cuts thru 64% of each stroke, returns in 36%.

The Crucible Steel Company of America with 26 branch warehouses and sales offices, has built a reputation for anticipating customers' needs, not only in high grade and special steels, but in service requirements as well. They were among the first to equip several of their warehouses with modern high speed MARVEL Saws (No. 6 and 9A series) in order to give fast service on either single lengths or large quantities of identical pieces, accurately cut from bars up to 10" x 10" cross section. Now in anticipation of new demands for larger sizes, they are the first steel company to install a No. 24 MARVEL Hydraulic Hack Saw in order to give fast service on orders for steels of any type in sizes up to 25" x 26" cross section.

This giant hack saw, which almost qualified as a "secret weapon" because it contributed so materially to our production capacity in building naval ordnance, applies an entirely new principle of reciprocation that has made "hacksawing" of large work practical for the first time.

Whatever your metal sawing problems, there is a MARVEL Saw exactly suited to your needs. A MARVEL field engineer will be glad to go over your metal sawing problems with you.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

3700 BLOOMINGDALE AVENUE, CHICAGO 39, U.S.A.



No. 1, No. 2 Series



No. 4B Series



No. 6 Series



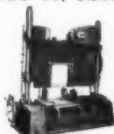
No. 9A Series



No. 8 Series



No. 18 Series



No. 24 Series

MARVEL SAWS

THESE NEW **HOBART** ARC WELDERS
MAKE GOOD WELDING A LOT EASIER..



and faster production is the result...

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Comparison with competitive arc welders will convince you of Hobart's superiority, for you can recognize to your own satisfaction how the outstanding design, operation and convenience of the Hobart welder are real assets that insure better welds, more profit.

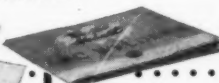
Hobart engineers, through years of experience and research, have developed multi-range control—your assurance of obtaining the exact welding heat for each particular job, and remote control—a real time-saver. The remarkable stability of

the arc and the handy controls make Hobart the favorite of all welders. In the complete Hobart line you'll find an arc welder in a model and size to suit your requirements. For detailed information, clip coupon and mail today. **HOBART BROTHERS**

COMPANY, Box TB-67, Troy, Ohio

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Tested—Improved—
perfected for each specific job. Write for descriptive literature.



"One of the world's largest builders
of Arc Welders"



Hobart Brothers Co., Box TB-67, Troy, Ohio

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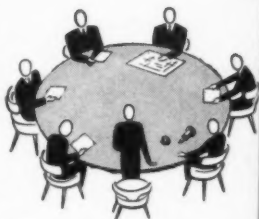
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world's largest builders of
arc welders



there's a place for YOU at the **GISHOLT "ROUND TABLE"**

Take your place here—whenever you seek new and better methods of producing round or semi-round parts! For this Gisholt "Round Table" symbolizes more than 50 years of collective experience in the manufacture and applications of metal-working equipment. And that experience—practical, authoritative—is yours to use in saving production time and cost.



your problem is carefully studied

Perhaps the solution is already waiting for you. If not, you may be sure that Gisholt's specialists will consider it as their own problem. Whether it involves large or small lot production, they will suggest the methods and equipment best suited to your individual needs.

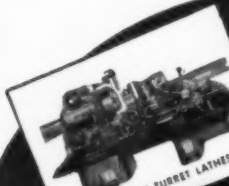
and the most practical solution is found in the broad Gisholt line

Here you may be sure of unbiased judgment, for Gisholt's interest and experience are not limited to one or two classes of machine.

Here are length and breadth of experience in machining surface-finishing and balancing round or semi-round parts that are best evidenced in the completeness of the Gisholt line in:

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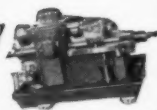
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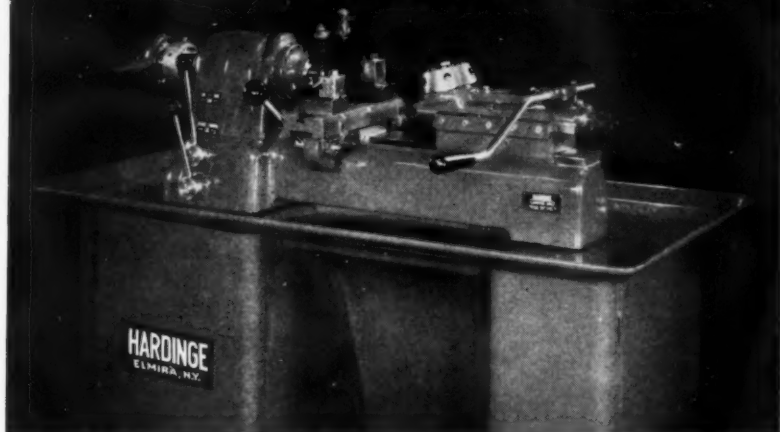
BALANCERS



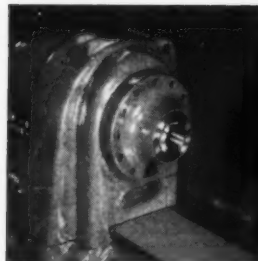
THE GISHOLT ROUND TABLE represents the collective experience of leading specialists of the machining, surface-finishing, and balancing round and semi-round parts. We welcome your problems.

HARDINGE
ELMIRA, N.Y.

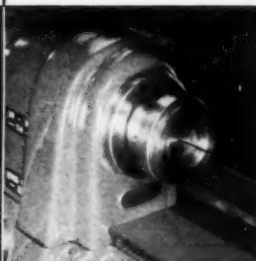
"Unusual capacity" describes
the **HARDINGE High Speed Precision**
Second Operation Machine



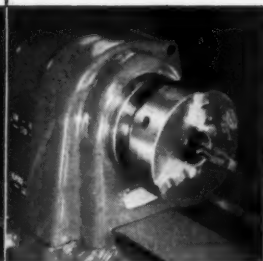
1" COLLET CAPACITY



6" STEP CHUCK CAPACITY



5" JAW CHUCK CAPACITY



Write for Bulletin DSM 59 giving other features

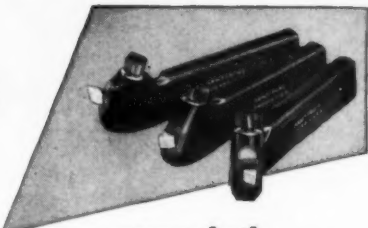
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Machine and Tool BLUE BOOK

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Because They Are
More Than
TWICE AS RIGID

These Grooving Tool Blades Are
**TWENTY TIMES
AS PRODUCTIVE**



Weaving—major cause of excessive wear in slender grooving tool blades—can now be overcome by using sturdy, hard blades of solid Kennametal. Here's one example—

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Kennametal grooving tool blades are made in standard widths from .080" to .250". Other sizes are available. Ask our nearest representative, or write for prices and particulars.



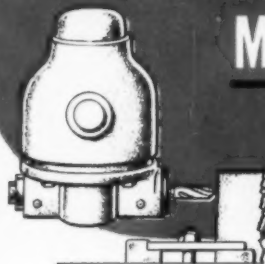
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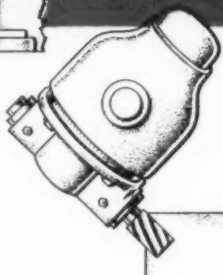
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Jack of all Trades...

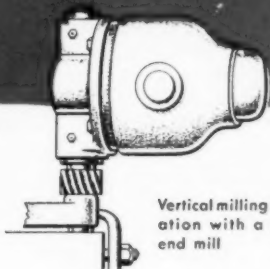
CINCINNATI UNIVERSAL SPIRAL MILLING ATTACHMENT



Drilling the end of a large part, using the longitudinal table feed



Milling a dovetail with a helical end milling cutter



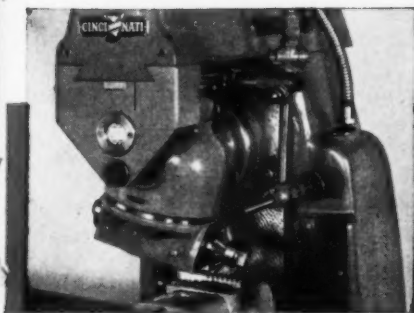
Vertical milling operation with a shell end mill



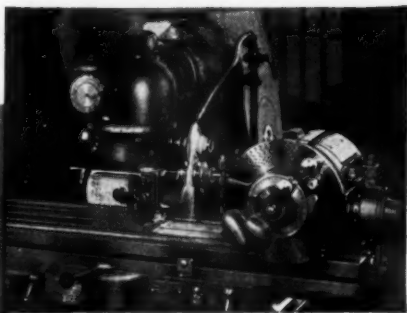
THE CINCINNATI MILLING MACHINE CO.

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The double swivel arrangement is used to advantage in milling the teeth of this broach insert

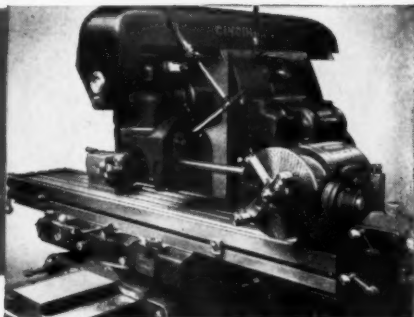


Milling a worm, on a CINCINNATI Miller equipped for short leads

● A veritable jack of all trades, the CINCINNATI Universal Spiral Milling Attachment is master of them, too. It greatly extends the versatility of CINCINNATI Plain and Universal Millers . . . in the toolroom . . . in the production line. A few of its many uses are shown here. ¶ The attachment can be swiveled 360° in two planes; has a one to one spindle speed ratio; No. 10 B & S taper hole in the spindle; can be easily set up and removed as desired. Complete details will be found in catalog M-804-1.



Setting up the Universal Spiral Milling Attachment



Here, a special spindle carrier acts as a "follower" to support the work under the cutter

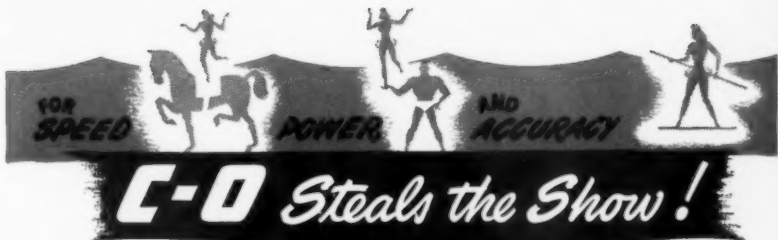
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Improved Snagging Wheels, developed by "American" for either high or low speed machines, hog off surplus metal *faster!* Their rapid cutting action and clean stock removal lowers snagging costs on floor stands, swing, and portable grinders. These "American" Wheels are made with Carbolite or Aluminos abrasives and special bonds — Vitrified for low speeds and Resinoid for high speeds. They have long wheel-life and are ideal for grinding steel castings and snagging forgings. Let us prove "American" Wheels will snag more units per day in your foundry—whether iron, steel or malleable.

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Designed to provide an accurate, fast, dependable drill for a moderate initial investment and low maintenance cost. Unit is equipped with anti-friction ball bearings; all castings are seasoned and sturdy; all gears of high alloy steel, accurately machined; all surfaces are hand scraped to a minimum tolerance. Available with V-belt drive — 16 spindle speeds. Power feed of positive, gear driven type. Four rates of speed are obtained through dial knob indicator. Automatic stop for predetermined depth drilling. 1-1/2" capacity.



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MAXIMUM in
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a slot about one-half inch deep
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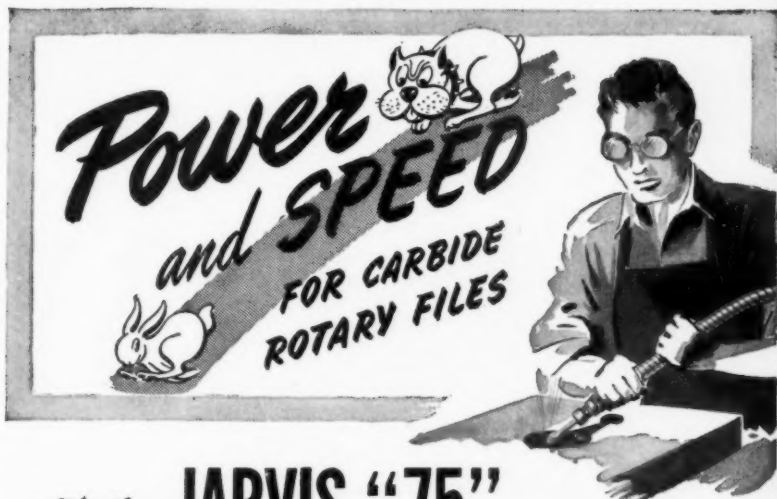
*From unsolicited reports to our field men by machine operators using Putnam End Mills, as well as by many plant executives responsible for milling production.



PUTNAM

TOOL COMPANY

2985 CHARLEVOIX AVENUE • DETROIT 7, MICHIGAN

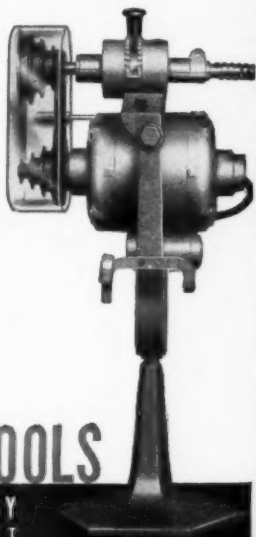


with the JARVIS "75"

The Multi-Jarvis "75" flexible shaft machines provide the ultimate in extra power and constant high speed for use with tungsten carbide rotary files. Tough jobs are made easy... operator fatigue is held to the minimum.

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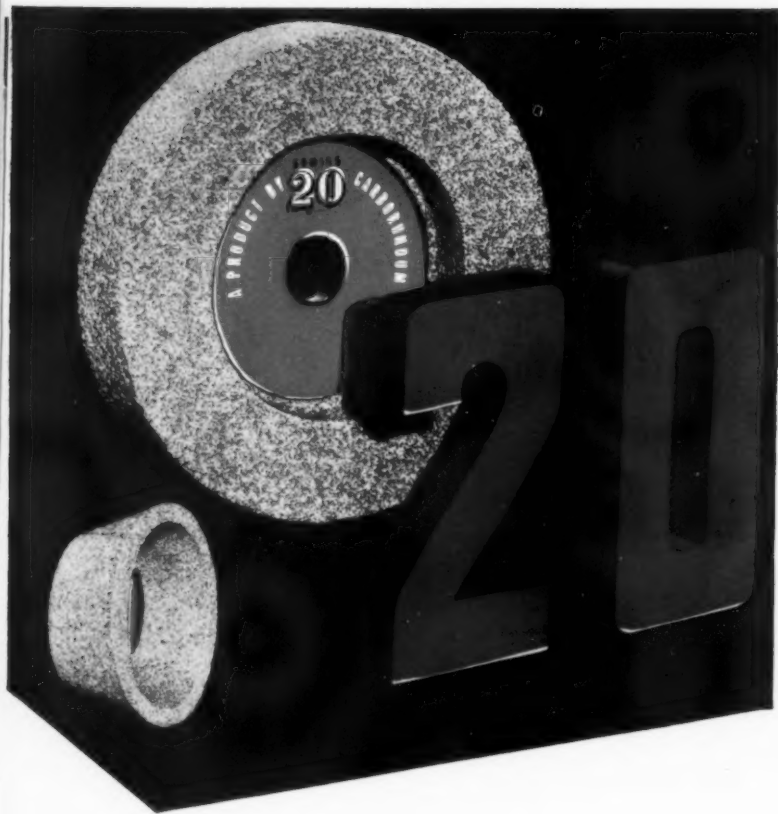
Jarvis tungsten carbide rotary files are ground-from-the-solid and are available in standard sizes in fine, standard or coarse fluting. Write for literature on Jarvis Power Tools.



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THE CHARLES L. JARVIS COMPANY
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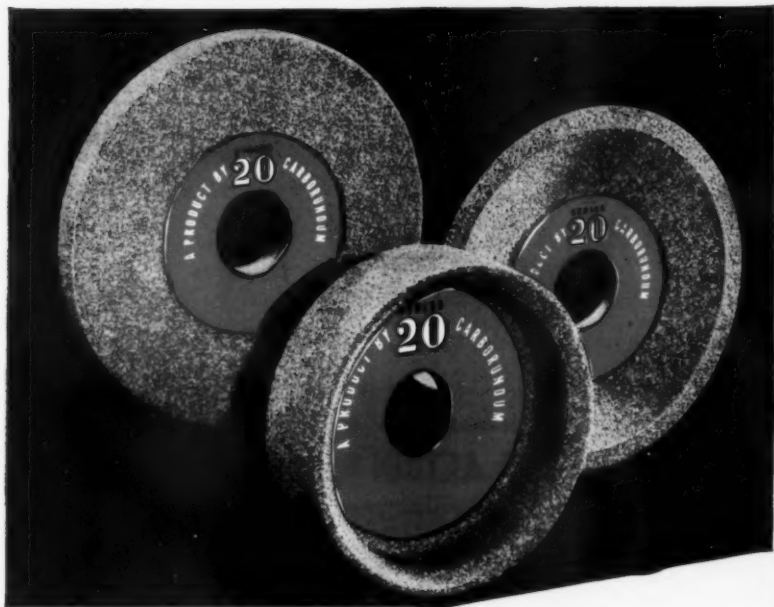
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- 5 **Longer Tool Life...between grinds**
- 6 **Increased Skill for Operators**
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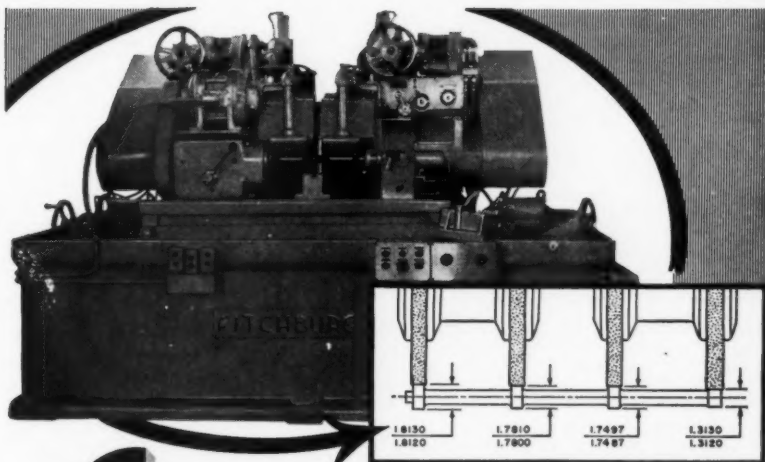
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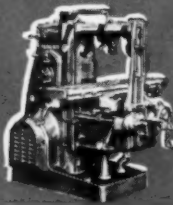
Big Choice Gives



MODEL 1H Swivel Head Vertical—Also available in Plain, Universal, Automatic Cycle Plain and 18" Manufacturing types.



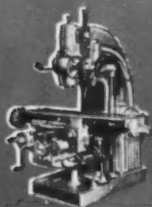
MODEL 2HL Universal—Also available in Plain and Swivel Head Vertical types and in Automatic Cycle Plain type.



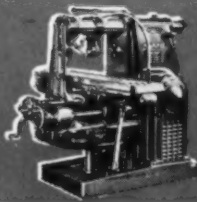
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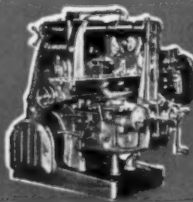
MODEL 3H Universal—Also available in Plain and Vertical types and in Automatic Cycle Plain and Vertical types.



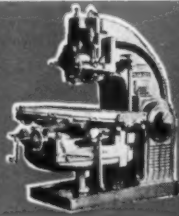
MODEL 2K Vertical Automatic Cycle—Also available in Plain and Vertical types and in Automatic Cycle Plain type.



MODEL 3KM Plain—Also available in Universal and Vertical types and in Automatic Cycle Plain and Vertical types.



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MODEL 4K Vertical—Also available in Plain and Universal types and in Automatic Cycle Plain and Vertical types.



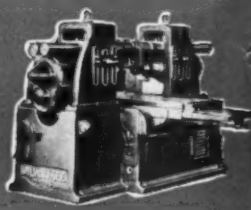
MODEL 50CSM Vertical—Also available: Plain and Automatic Cycle Plain and Vertical types. Choice of 2 working ranges.



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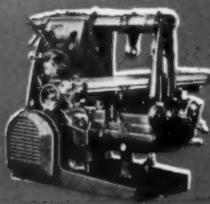


MODEL 1800 Duplex—Available in Duplex or Simplex models. Choice of 24"-36"-48" or 54" table travel.

You Better Buy!



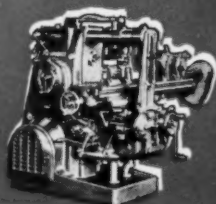
MODEL 4H Vertical — Also available in Plain and Universal types and in Automatic Cycle Plain and Vertical types.



MODEL 5H Plain—Also available in Universal and Vertical types and in Automatic Cycle Plain and Vertical types.



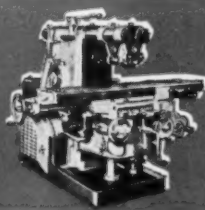
MODEL 2D Rotary Head Milling Machine.—One size and working range only. Especially suited to precision tool & die work.



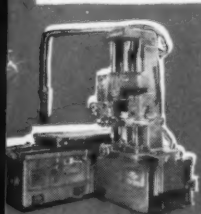
MODEL 2KM Universal—Also available in Plain and Vertical types and in Automatic Cycle Plain and Vertical types.



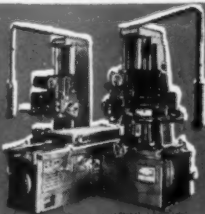
MODEL 20CSM Plain — Also available in Vertical and Automatic Cycle Plain and Vertical types. Choice of 2 working ranges.



MODEL 30CSM Plain Automatic Cycle — Also Plain, Vertical and Automatic Cycle Vertical types. Choice of 2 work ranges.



MODEL No. 3T Precision Milling and Boring Machine — Adjustable ram provides 12" travel for boring operations.



MODEL No. 3TT Precision Milling and Boring Machine—2 headstocks for multi-operation work on single workpiece.

Kearney & Trecker

Milwaukee Milling Machines — 97 Different Models, Sizes and Types mean the right machine for your job

There's a Kearney & Trecker for every milling job—in small shops, high production plants or precision tool rooms. Horsepowers range from 3 to 50 with wide working ranges and broad feed and speed ranges to suit.

Model K machines are general all-purpose machines. Model H machines are the intermediate type. The new CSMs are the most powerful standard milling machines ever built—specifically designed for carbide milling of steel, but suited for all-purpose work as well. For high speed production you can get the Manufacturing types in conventional, Simplex and Duplex models.

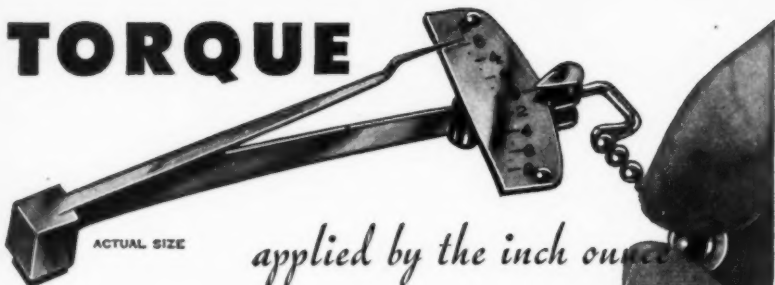
You'll find the Rotary Head Milling Machine and Models No. 3T and 3TT Precision Milling and Boring Machines are ideal for the specialized shop. To meet unusual or special machine requirements, there's Kearney & Trecker Customer Engineering Service where you get the benefit of nearly fifty years experience in precision and production machine tool design and manufacture.

Catalog E-53 gives you complete data on our entire line — Write for it! Please indicate your business connection.

KEARNEY & TRECKER CORPORATION

Milwaukee 14, Wisconsin

TORQUE



STURTEVANT Torque Wrench

Write for:

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describing the
STURTEVANT
torque wrenches in
capacities from
0-8 in. oz. to 7200
in. lbs. or 600 ft.
lbs.

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STURTEVANT
"Sensory" (high
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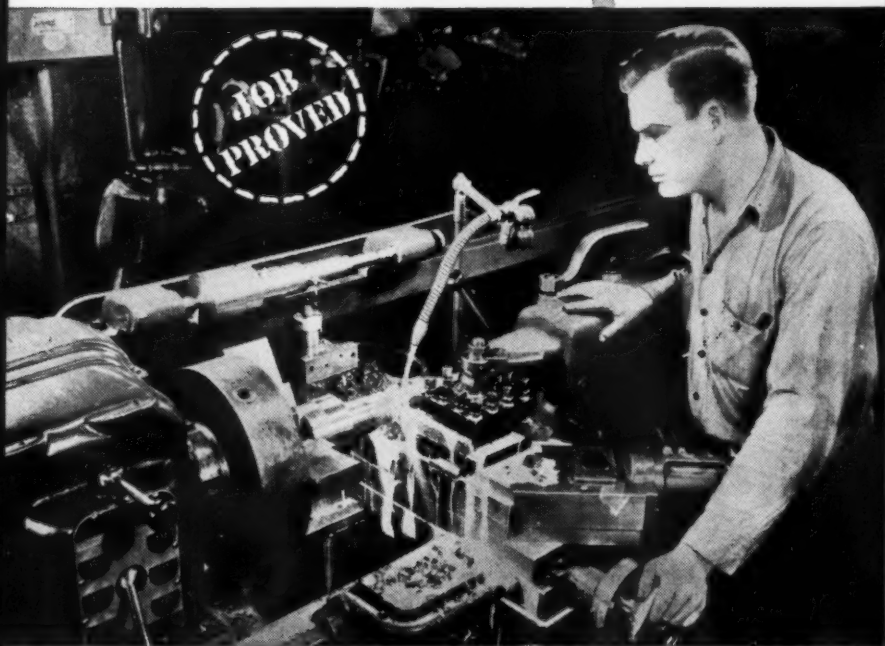
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Minute or delicate threaded parts can now be correctly assembled, safely adjusted, or rigidly inspected by semi-skilled labor. With STURTEVANT Torque Wrenches, every operator has the same "master touch," tightens each thread exactly to the specified torque whether inch ounces or foot pounds.

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P.A. **Sturtevant** CO.
ADDISON **QUALITY** ILLINOIS

Turning S.A.E. 4145 Annealed, 315 S.F.P.M.



SUNOCO EMULSIFYING CUTTING OIL . . .

Cools and Lubricates Carbide Tool Removing approximately 23 Cubic Inches of Metal per Minute

Here are the facts on a typical job where Sunoco Emulsifying Cutting Oil makes possible heavy cuts on annealed 4145 steel.

Operation: Turning 4 1/2" shaft and removing approximately 23 cu. in. of metal per minute

Machine: 16" x 54" "AMERICAN" Pacemaker multi-production lathe

Material: S.A.E. 4145 annealed steel

Spindle Speed: 280 R.P.M.

Depth of Cut: 3/8"

Cutting Speed: 315 S.F.P.M.

Feed: .017"

Type of Tool: Cemented carbide

Cutting Lubricant: 1 part Sunoco to 20 parts water

Sunoco Emulsifying Cutting Oil forms a stable emulsion when mixed with water. Its lubricating and cooling qualities make it particularly efficient for precision work at high speeds.

For more production . . . better finish . . . longer tool life . . . call your Sun Cutting Oil Engineer or write Department MT6.

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AT THE DODGE-CHICAGO PLANT

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More than 100,000 management, production, engineering, purchasing and financial executives from all over the world are going to be there. You'll find the answers to some of your present and future problems at the Machine Tool Show. You can't afford to miss it.

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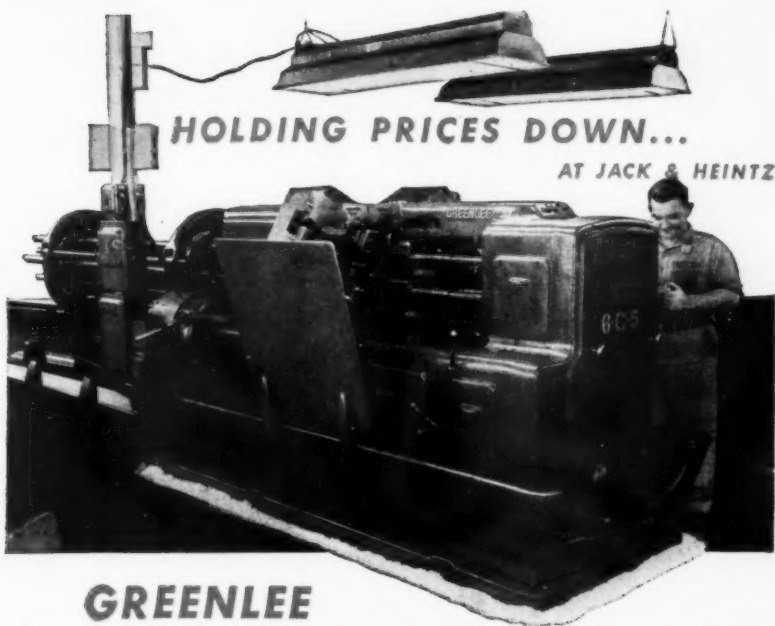
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Make your plans now, to attend. Send in your advance registration today. If you have not already received your copy, ask for the booklet containing information about hotel reservations, transportation from downtown Chicago to the show, etc.

MAIL YOUR ADVANCE REGISTRATION TO:

National Machine Tool Builders' Ass'n,
10525 Carnegie Ave., Cleveland 6, Ohio





GREENLEE SIX-SPINDLE AUTOMATICS



This FHP Motor Armature Shaft is one of the many parts made on Greenlee Automatics at Jack & Heintz Precision Industries, Inc., Cleveland, Ohio. The production rate is 100 per hour per machine. Stock: SAE X-1555 CRS, 13/16" bar diameter, overall length 9-29/32". Other parts produced are bearing races, magneto rotor shafts, and aircraft accessory parts.



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1836 MASON AVE.
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During the war years, the efficiency of men and machines of "Jahco" made history. Then, even as today, the company's policies were based on the premise that low prices keep a company in business... that low prices, as well as high wages, are made possible by efficient production.

In 1942, Jack & Heintz Inc., (now Jack & Heintz Precision Industries, Inc.) purchased their first Greenlee 6-Spindle Automatics — six 1-5/8" machines. Today, on normal production work, these machines have a permanent berth in the "Jahco" economy. Their efficiency, versatility, and ease of operation are considered important features useful in "Jahco's" production plans for the future.

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Also "C" Recessing Tool with No. 8 Cutter, making single recess in 1" collar, operating in a drill press equipped with modified universal lathe vice.

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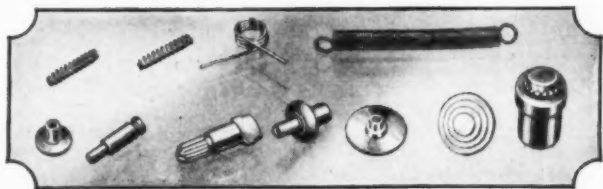
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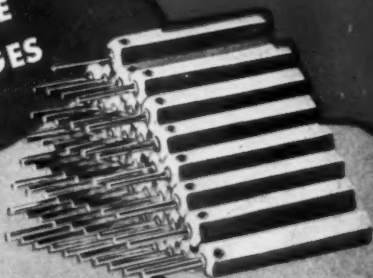
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CARBOLOY WIRE TYPE PLUG GAGES



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50

TOOL STEEL
GAGES

Wire type plug gages were originated by The Van Keuren Co. in 1925 and are now recognized as the most economical gages for measuring small holes.

The original wire type plug gages were made of tool steel. The use of high speed steel doubled gage life. Precision chrome plate gave five times the life, and now gages of carboly are available with fifty times the life of tool steel. All of these materials are still in use and have their particular applications and advantages.

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On your next order specify VK wire type plug gages. VK Carboly for long runs because of the enormous saving in gage cost. VK Carboly for fussy jobs because of the infinitesimal gage wear and insurance that the parts will be within the specified limits. VK Tool Steel—High Speed—Precision Chromium for less exacting jobs. You will be assured of the best in accuracy, quality and delivery.

Write for circular C 35 on Carboly wire type plug gages, Thread measuring and Gear wires.

Write for your copy of catalog and handbook No. 33. It contains complete information on Van Keuren precision gages and instruments and valuable engineering formulas and data on measuring problems.

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300 to 1000% MORE HOLES**

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PATENT NO. 2403861

CENTER DRILLS

**TIP
CLEARANCE**

**TIP
CLEARANCE**



This photo is 3 times actual size of a patented HY-CO J2 center drill.

TIP CLEARANCE PROLONGS LIFE

Center drill breakage can be reduced only when drills have "Tip Clearance", and only HY-CO Drills have this patented feature. Savings due to tip clearance are phenomenal. HY-CO Drill users (names on request) are reporting two to four times increased tool life, and some records (available) show savings up to ten times greater than with conventional center drills.

How Tip Clearance Prevents Breakage

Note from enlarged photo above and the side sketches, that there is a decreased load on the cutting edge. Due to tip clearance there is freedom from binding in the pilot hole, which combined with the greater spiral relief made possible by the drill contour, permits easier flow of chips and less danger of chip jamming. But longer drill life is not the only advantage of HY-CO Center Drills.

Band Contact abolishes out-of-round work

The Sphere-O-Form contour leaves a hole with convex sides. When the 60° machine center enters the curve it automatically establishes a true, never changing center of rotation. This **BAND CONTACT ABOLISHES OUT-OF-ROUND WORK** and provides increased lubrication for a cooler bearing between work and machine center.

HY-CO Center Drills not only outlast old style center drills, abolish out-of-round work, and increase machine center life, but they eliminate the need for type "B" drills by automatically providing the safety feature of bell-type drills. Write today for complete information, prices and nearest distributor—HOWARD H. HEINZ, INC., DEPT. BB, 318 BOULEVARD BUILDING, DETROIT 2, MICHIGAN.

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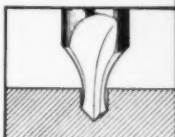
Keyseat Cutters



Center Reamers



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Due to tip clearance only the very tip of a HY-CO drill does the drilling. Normal frictional heat is less; it is created only at the tip—is dissipated over radial surface.



A finished center hole. The Sphere-O-Form contour abolishes **FATIGUE POINT**—the convex center hole enables the machine center to form a **BAND CONTACT** which eliminates galling machine centers.



SUPER *Carbide Tipped* **SPECIAL TOOLS**

SUPER *Carbide Tipped*
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EJECTOR-TYPE TOOLS	BORING TOOLS
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Get the benefit of *Super's* many years of experience, solely in the field of Carbide Tipped Tools.

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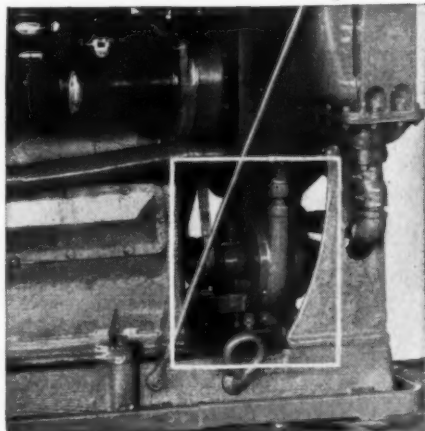
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SEND for your copy of the NEW VR-400 Carbide Tool and Blank Catalog. 32 pages of vital carbide engineering data.

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The amazing growth of cemented carbides in the past decade has opened the way to tremendous production increases. Vascoloy-Ramet, manufacturers of V-R Tantalum/Tungsten carbides is foremost in the development of carbides in industry. In keeping with this tradition of leading industry in carbide tool performance, V-R now takes another significant step forward by introducing V-R "CUSTOMER STANDARDS." Studies reveal that most users alter standard carbide tools before putting them to work . . . an entirely unwarranted cost! **BECAUSE TODAY . . . V-R "CUSTOMER STANDARD" tools, made to your design, can be used without ANY alterations, available in any grade and quantity at prices, less in fact, than it costs you to alter your present standard tools to shop specifications.**



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The Hammond VRO Variable Speed Polishing Lathe definitely will step up production and improve finish. Maximum wheel economy is assured, too, because efficient peripheral speed can be maintained at all times — wheels can be used right down to the flanges before discarding.

Hammond

VRO
VARIABLE SPEED

**POLISHING
AND
BUFFING
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Catalog showing all Hammond polishing lathes, abrasive belt, "OD" and automatic finishing machinery gladly sent on request. Write today!

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does it

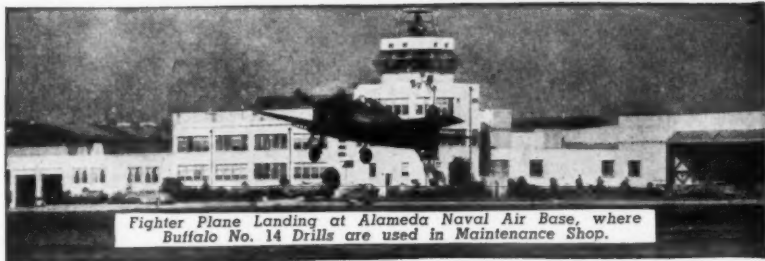


See Hammond Equipment in OPERATION at booths 65, 66, 67 and 68 at the Industrial Finishing Exposition, Detroit, June 23 - 27.



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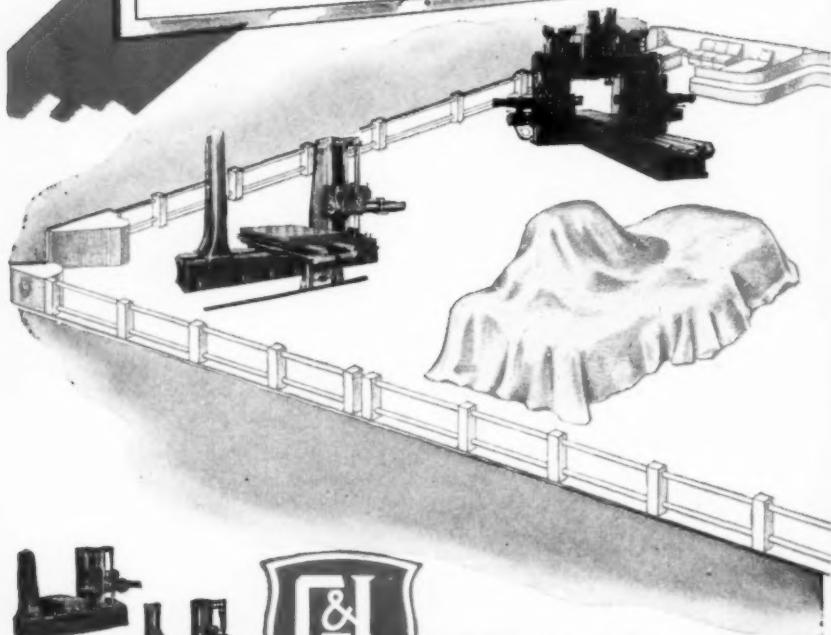
Buffalo, N. Y.

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**NO. 14
DRILLS**

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**ADDITIONAL MACHINES TO
ROUND OUT THE G. & L. LINE**

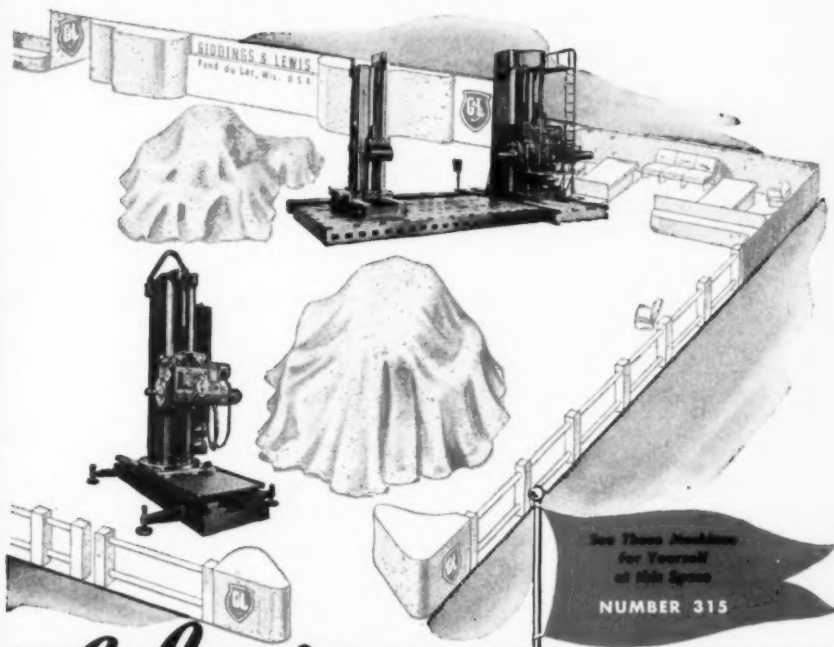


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Offering a New High in Versatility for Certain Classes of Machining...Standard Giddings & Lewis Machines Continue to Handle Most Work Requirements

When you see these G. & L. machines at the National Machine Tool Show, you will agree that this equipment can supplement your present and future horizontal boring, drilling and milling machines. They are designed to give greater accuracy at modern feeds and speeds to meet changing production requirements on specific types of work.

Yes, look to G. & L. for sound, basic, progressive ideas. See how this far-sighted company incorporates such practical ideas in new equipment developments. Observe the way these added models can be coupled in performance with horizontal boring machines, thus enabling you to produce more at greater profit.



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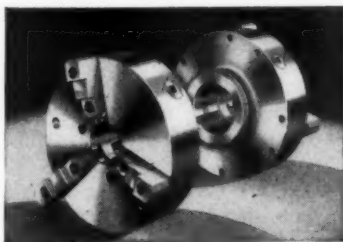
Chuck NEWS

PUBLISHED BY THE
SKINNER CHUCK CO., 340 CHURCH ST., NEW BRITAIN, CONN.

The Best Chucks are the Only Chucks for today's production requirements

The Skinner Chuck Co. is building a line of Self-Centering Scroll Chucks, Series 3900, with the high degree of precision necessary for modern production and tool room work. The bodies of these chucks are of tough forged steel and can be furnished with taper recess for direct mounting on the American Standard Spindle Nose Types A-1, A-2, B-1, B-2, Cam Lock Type D-1 or Long Taper Key Drive Type L. These chucks can also be furnished with a straight recess in the back so they can be mounted on threaded spindle noses by means of a threaded adaptor plate.

Skinner furnishes these chucks with two-piece jaws made to American Standard dimensions. The top jaws



*Series 3900-L Self-Centering Scroll
Chuck with Long Taper Key Drive*

are interchangeable and can be used on any chuck of the same series and size in your plant. When special shaped top jaws are necessary to hold a work piece, it is a great aid to production to be able to put the job on any machine in the plant that is equipped with the same size chuck.

The scroll plates and pinion are made of alloy steel carefully heat-treated, then ground to gage.

The Series 3900 Chucks are worthy of the most modern, most accurate machine tools made today—they will get the best out of your older machine tools too. Write today for your copy of the new Skinner Catalog No. 59.

**HAND & POWER OPERATED MACHINE CHUCKS—AIR CHUCK EQUIPMENT
—FACE PLATE JAWS—MACHINE VISES**



25¢ NOW DOES WORK OF DOLLAR

AIR pressure was down to 40 lbs. in this casting cleaning room of a motor manufacturer. Grinding output wasn't what it should be. The Rotor Application Engineer was called in for an unbiased analysis based on either Air or High Cycle equipment. He recommended High Cycle because the frequency changer and tools would cost one-third as much as an additional compressor and air tools. Results:

Saves 75%. Operators now clean castings four times as fast. Each uses two Rotor High Cycle

Grinders—one with 6" cup wheel and one with 3" plug wheel—to reach all surfaces.

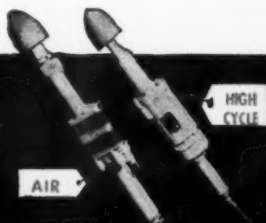
In this unusual case, the saving due to increased output paid for entire High Cycle installation in less than 4 months.

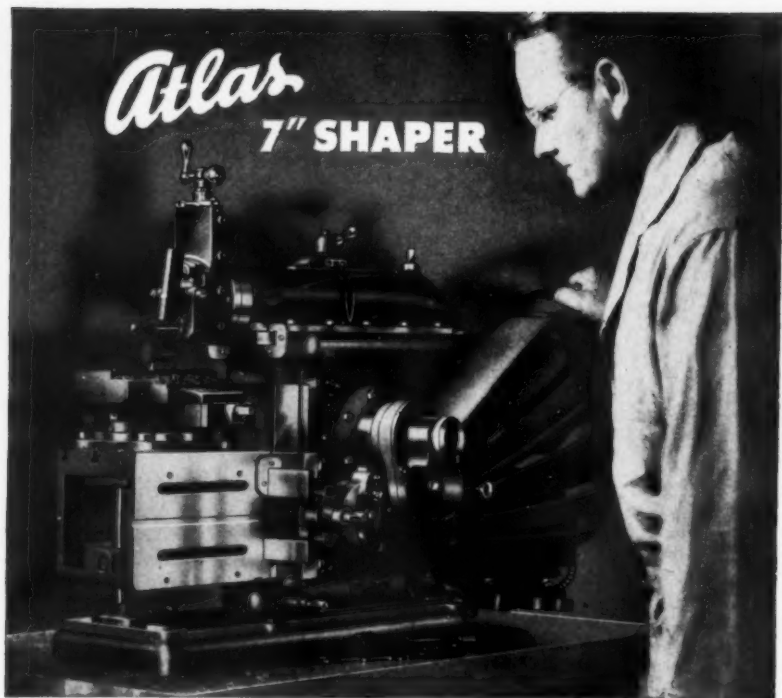
Perhaps the Rotor Application Engineer can discover something similar in your plant.

HI-CYCLE O'TOOL

THE **ROTOR TOOL** CO.
—CLEVELAND, OHIO—

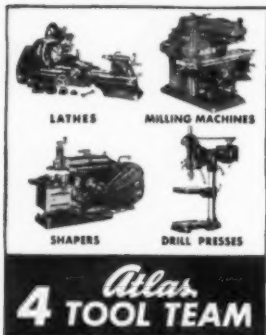
UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS





Atlas 7" SHAPER

BUILT TO MAKE MONEY for YOU



LATHES

MILLING MACHINES

SHAPERS

DRILL PRESSES

Atlas
4 TOOL TEAM

Most shaping operations in shop or tool room are within the 7" stroke of an Atlas shaper. That is why its compact size is such an advantage. It saves on set-up time, saves on machine hour cost, saves on power. Savings that quickly translate into profits.

The Atlas shaper handles close tolerance work to perfection. Gives you a selection of cutting strokes between 45 and 186 per minute, speeds from 3½ to 116 fpm. It is Timken bearing equipped. Operates from ½ HP motor. Send for catalog with complete specifications and operating details.

ATLAS PRESS COMPANY
650 N. Pitcher St., Kalamazoo 13D, Mich.



SAVE

time

If it's metal cutting, move the handy Wells saw to the job. It's portable... self-contained... versatile! Save the time lost in moving material in and out of metal cutting rooms. Get jobs finished quickly, indoors or out. Reduce shop congestion.

manpower

Wells Metal Cutting Band Saws are easy to use... quick to set up... require little supervision. With a Wells, one man can handle many miscellaneous cutting jobs along with other work.

material

The Wells saw does good work... cuts close... removes minimum stock. Because operation is simple, any shop man can use it safely and efficiently with minimum waste.

money

No large capital investment is required for a Wells saw, the machine with many uses. Power operating costs are low. It occupies little floor space and is a profitable utility tool for countless shops. For complete information, send for interesting descriptive literature or see your local Wells distributor.



The No. 8 showing new Wells Wet Cutting System - an economical accessory available for all No. 8 Wells Saws.

Wells

METAL CUTTING BAND SAWS

Specifications

CAPACITY:

Rectangular	8" x 16"
Rectangular (special guides)	5" x 24"
Rounds	8" O. D.

MOTOR 1/2 H.P., A.C. or D.C.

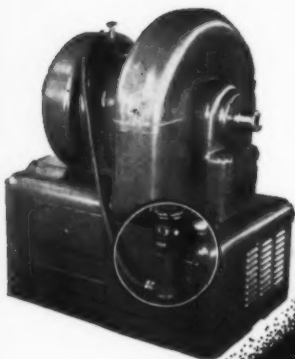
SPEEDS Selective 60, 90, 130 feet per minute

WEIGHT Approximately 665 pounds

WELLS MANUFACTURING CORPORATION

707 COOLIDGE AVE., THREE RIVERS, MICH.

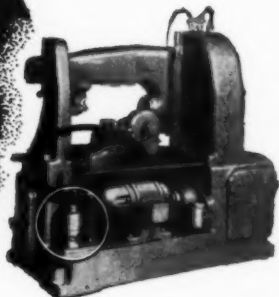
Products by Wells are Practical



*Photos Courtesy
Barber-Colman Company
Rockford, Illinois*

*The Etna Machine Company
Toledo, Ohio*

**SIMPLE
STURDY
SATISFACTORY**



RUTHMAN GUSHER COOLANT PUMPS

Simply designed, with fewer moving parts, Ruthman Gusher Coolant Pumps are quickly and easily installed. Their overall sturdy construction assures you long trouble-free life and satisfactory service under every plant condition. Remember there's a type and size to meet any coolant requirement.

Illustrated at the left above is a 1/10 H.P. Model 4 P-3 Gusher Coolant Pump on an Etna No. 150 Swaging Machine. Below is a Model 11021 Long Gusher Coolant Pump on a Barber Colman Type "D" Hobbing Machine.

Write for Catalog 10-G

THE RUTHMAN MACHINERY CO.



1816 READING ROAD

CINCINNATI, OHIO



**RUGGED AS A RHINO
FOR DEEP HOGGING CUTS**

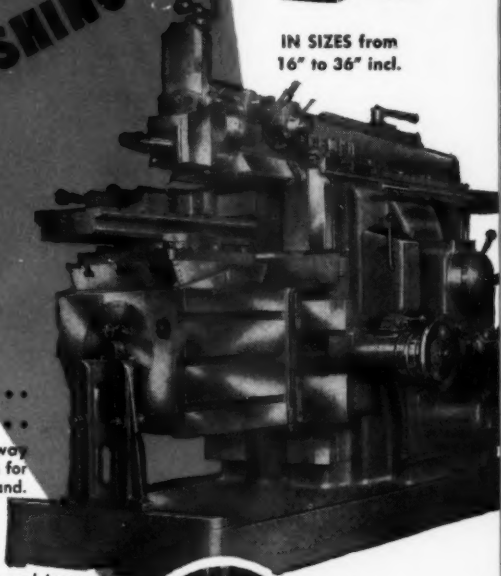
GEMCO

MULTI-PURPOSE
SHAPERS

**PRECISE AS A JEWEL CUTTER
FOR THOSE FINISHING CUTS**



IN SIZES from
16" to 36" incl.



**LESS MAN HOURS PER JOB...
MORE PROFITS PER DAY.....**

IN GEMCO Multi-Purpose Shapers you get 2-way production efficiency...an unmatched ruggedness for those deep hogging cuts on the workpiece at hand. Then, with a quick switch of the tool bit and re-setting of the machine, it produces to close tolerances for the precise finishing cuts. This adaptability and efficiency is rarely found in ONE machine! Thus you save on production time and increase profits. Featuring also the exclusive GEMCO Lubrigard, the safety device that prevents injury to the machine should any failure in the lubricating system occur, GEMCO Shapers give you service plus...and the most for your money. Furnished in three models ...Plain, for average shop work; Production, for general machine shop and heavy production work; Universal, for tool and die work. Size of stroke...16" to 36" incl. GEMCOS are the Shapers on which to standardize for a high standard of work.



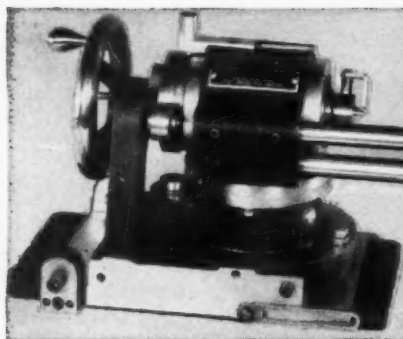
**WITH
EXCLUSIVE
LUBRIGARD
SAFETY
DEVICE**



**MFGS.
OF PRECISION
MACHINERY**

WRITE TODAY FOR DESCRIPTIVE BULLETIN GC-13 B

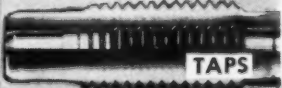
GENERAL ENGINEERING & MFG. CO.



D-S
**PRODUCES RADIAL
 FORM RELIEF ON
 TOOLS LIKE THESE
 EASY AND FAST!**



Once-slow, costly radial relief grinding is now fast and inexpensive. Without special skill, any good grinder hand can now relieve a wide variety of tools including those shown at the right, giving you the benefit of faster, better cutting. Radii can be brought up to the cutting edge. Sharp corners can be produced without undercutting. Any width land can be left on diameters following the true spiral of the flute.



Write for literature, prices and the complete story on the D-S Grinder



D-S Grinder Division

ROYAL OAK TOOL & MACHINE CO.

621 E. FOURTH ST., ROYAL OAK, MICH

ANNOUNCING

7 NEW SKILDRILLS...

7 NEW GOOD REASONS TO
SKILDRILL IT!



• The new SKILDRILLS you've wanted and waited for are here. They're new in design and engineering... in lightness and compactness... in drilling speed and power. New SKILDRILLS will bring you better, faster, easier drilling and longer service on every job. Ask your distributor about a demonstration TODAY!



MODEL 241
3/8 in. Standard



MODEL 242
3/8 in. Special



MODEL 243
3/4 in. Heavy Duty



MODEL 244
3/8 in. Slow Speed



MODEL 250
3/8 in. Special



MODEL 253
3/8 in. Heavy Duty



MODEL 260
3/8 in. Special

SKILTOOLS

SKILSAW, INC. 2033 Elston Ave., Chicago 90, IL.
Factory Branches in Principal Cities



© 1965 SKILSAW, INC.

*Fluidmotion** Radius and Angle Dressers save time in ACCURATE FORM DRESSING

"FLUIDMOTION", an exclusive J & S development, automatically blends any combination of angles and arcs in **one** continuous motion, with **one** setting, using **one** handle. Produces clean, precise form without tool or chatter marks. Available in models C, E and F... also the Form Master, an accurate lower priced dresser. Send for folder.

*REG. U. S. PAT. OFF.

Fluidmotion Features

- automatic centering
- .0001" accuracy
- one setting per form
- 14" wheel capacity
- large radius range
- dustproof
- chatterless



J & S TOOL CO.

471 Main Street, East Orange, N. J.
Representatives in Principal Cities.

QUICK CHANGE TO SAFETY

with

FOOTHOLD SAFETY TREAD



The previous operator on this radial drill sustained a painful back injury when he slipped and fell on the oily metal floor plate. But this operator won't! Forty minutes and five cleats of Foothold Safety Tread have removed that slipping hazard for keeps.

Easy application and positive non-slip—that's Foothold Safety Tread. Fully effective when wet with water or oil, it prevents falls and speeds footwork because it provides a "sandpaper-rough" surface that holds. It is completely waterproof and weatherproof; resists oil, grease, alkalis and mild acids—and can be used immediately after laying.

Foothold Safety Tread is provided in roll or cleat form for instant application to any smooth clean floor surface, permitting waste-free "pin-point" application to localized hazard areas on ramps, stairs, aisles and walkways.

Return the coupon for the special "Safety Engineers 12-Cleat Safety Kit"—or write for descriptive booklet, with samples.



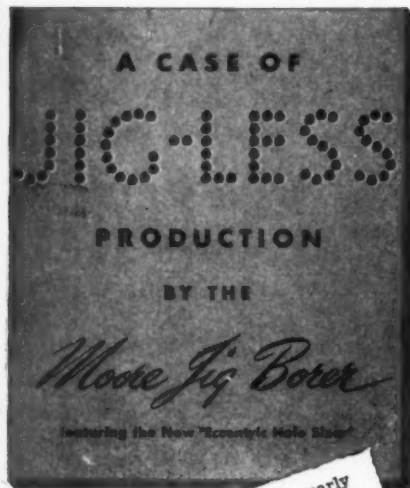
BEHR-MANNING
TROY, N. Y.

Please ship special **FOOTHOLD SAFETY TREAD KIT** containing 12 Standard Cleats 6" x 24", One Quart Foothold Cement and instructions for laying. Price \$7.50.

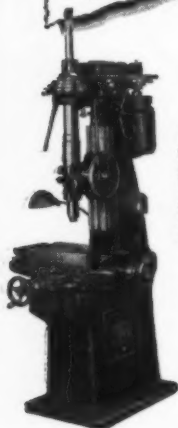
Company Name
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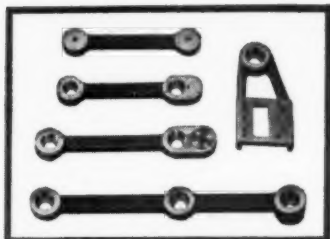
BEHR-MANNING
DIVISION OF HORTON COMPANY
TROY, N. Y.



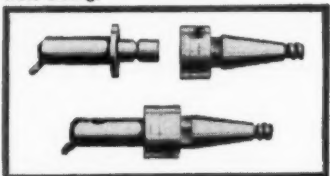
The Problem—100 sets of parts yearly (see top photo), 25 sets per lot...holes approximately 2" in diameter.
The Solution—Produced in Moore Jig Borer at low cost because of minimum special tooling, to tolerances in "tenths," and in "Jig Time."



Ideally Suited for jigs, fixtures, dies, machine parts and jig-less production, the Moore Jig Borer is sensitive for holes 1/32" in diameter, yet rugged for heavy cuts up to 4 1/2".



The Parts—Aluminum castings, requiring stock removal, hole location and hole sizing.



New Moore Eccentric Hole Sizer (shown assembled and disassembled)—sets a carbide bit to .00005" (half-tenth) simply and easily. Taper shank allows tool changes in matter of seconds and will repeat hole diameters when single point sizing. Vernier setting of bar permits fine adjustment through a range of .004", plus conventional tool bit adjustment.



In The Moore Jig Borer—Simple fixture holds work. Speed in handling this production problem is due to Moore Jig Borer's wide spindle speed range (to 2,600 RPM), and quick-setting lead screws. The latter are ground to an accuracy of .0002" in 16".

Write today for complete descriptive literature

MOORE SPECIAL TOOL COMPANY, INC., 728 UNION AVENUE, BRIDGEPORT 7, CONN.

MOORE JIG BORER

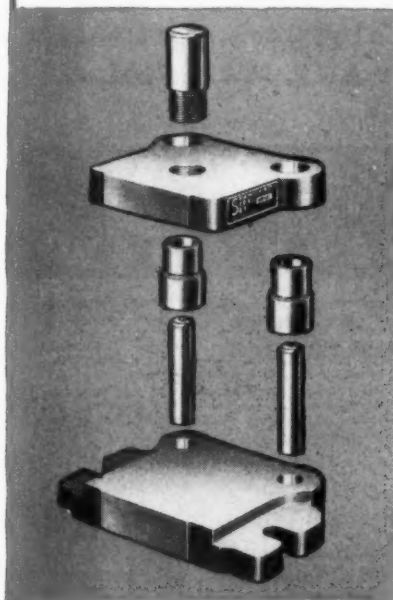


SPOTS. DRILLS. BORES. REAMS... WITH MINIMUM TOOL CHANGES

"Standard" STEEL DIE SETS

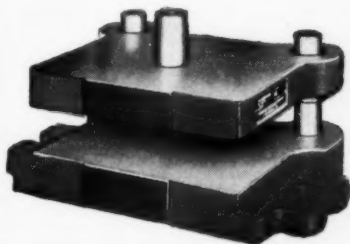
INTERCHANGEABLE PARTS REDUCE DOWN TIME

KEEP PRESSES *at work!*



"Standard" back pin Steel Die Sets, manufactured to extremely close limits by latest methods, are proving their worth with many users who want to increase production and reduce tool maintenance costs. All parts — die shoes, punch holders, pins and bushings—are interchangeable from stock. Without re-work or fitting . . . or even taking the die set off the job . . . any part can be quickly and economically replaced with minimum loss of productive machine time.

"Standard" Steel Die Sets are available in a complete range of sizes. Write for Catalog DS.



STANDARD MACHINERY COMPANY

1555 ELMWOOD AVE., PROVIDENCE 7, R. I.

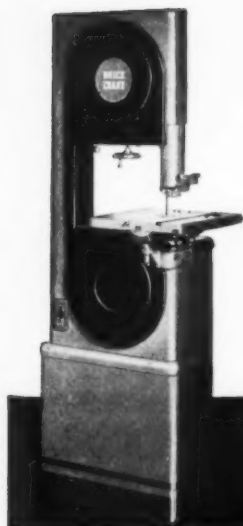
CLEVELAND
The Die Supply Co.
5349 St. Clair Ave.
EXpress 1133

DETROIT
Die-maker Supplies Co.
2679 E. Grand Blvd
TRinity 1-2865

Branch Warehouses:
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768 St. Paul St. W.
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Fidelity Tool Supply
309 Vine St.
CAMden 4-7765

WORCESTER
Lindco, Incorporated
1023 Southbridge St.
WORcester 6-4637



FOR SPEED AND ACCURACY

IN
CUTTING PRACTICALLY
ANY MATERIAL

BOICE-CRANE Series No. 2300 14" BAND SAW

Operates at higher speed—4,400 blade feet per minute. Smoother and faster cutting. Sturdy enough for foundries and production. Accuracy to spare for tool and die work, like contour sawed cams, dies, and punches; ideal for experimental laboratories and pattern shops.

Single and 8-speed back-gear models for cutting practically any material. Clears $8\frac{3}{8}$ " under the guide.

One-piece welded steel frame has tremendous strength. Wheels and blade, except at cutting point,

are entirely enclosed. Cabinet type base has sealed-off motor compartment. High safety rating.

Blade guides adjust by a single control, and with full safety, even when machine is running. Close balance and light, but strong Textolite wheels permit twice the speed of other 14" machines. Less vibration, and longer bearing life. Saws wood two to four times faster. Often pays for itself in 3 to 6 months.

SPECIFICATIONS:

Sawing Capacity: Blade to guard— $13\frac{1}{2}$ ". 27" dia. work. Guide to work table— $8\frac{3}{8}$ ".
Table: Tilts on Double Trunnions. Size $15" \times 15\frac{1}{2}"$.
Height Overall of Floor Model: 67".
Blade Widths: $3/16"$, $1/4"$, $3/8"$, $1/2"$ and $3/4"$.
Length of Blade: 98".
Wheels: Disc. Moulded Textolite, 14" dia. 1" face.
Bearings: Grease-sealed Ball Bearings.

FOR A GUARANTEE OF SATISFACTORY SERVICE

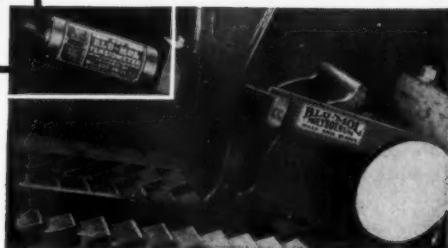
buy only from long established manufacturers who SPECIALIZE in producing power tools, rather than making them a sideline.

WRITE FOR FREE LITERATURE
BOICE-CRANE COMPANY
936 Central Avenue • Toledo 6, Ohio
DRILL PRESSES • JIG SAWS • BELT SANDERS • LATHES • JOINTERS
SAW JOINTERS • THICKNESS PLANERS • TILTING ARBOR SAWS
SPINDLE SANDERS • SPINDLE SHAPERS • BAND SAWS

The new BLU-MOL "TENSIONOMETER"

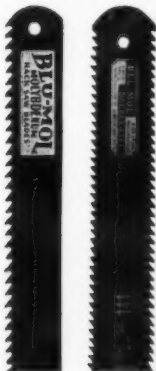


offers longer
blade life,
more accurate
cutting



A small cylinder quickly attached to your hack saw machines, the Blu-Mol "Tensionometer" can effect substantial savings and at the same time enable your plant to produce better work. By positively controlling any desired tension from 0 to 4,000 pounds, the Tensionometer definitely:

1. Improves the accuracy of cut.
2. Maintains constant tension in spite of lengthening of the blade due to heating and eye elongation.
3. Absorbs shocks, minimizes blade breakage.
4. Promotes faster cutting.
5. Greatly increases the cutting life of any blade.



Let us prove to you how much the Blu-Mol Tensionometer and Blu-Mol High Speed Molybdenum Blades, single or double edge, can improve efficiency in your plant. Just give us the name of the individual supervising metal sawing, the name of machines and sizes of blades used, and we will arrange a run right on your own machines that will show some surprising results.

One Thing in Common — Quality!

MILLERS FALLS COMPANY
GREENFIELD • MASSACHUSETTS

EXTRA WEIGHT-SPEED-CAPACITY IN THIS MODERN-DESIGNED CUT-OFF TOOL

ONE LOOK at the Johnson Band Saw tells you that it is designed on up-to-the minute machine tool lines—

For instance, the **THREE POINT SUPPORT**—three heavy, box section legs which make the most uneven floor as level as a toolmaker's surface plate. Wide span at rear gives full stability—single leg at front is out of operator's way. The **BROAD, DEEP BED**, immune to distortion. The **QUICK-ACTING VISE**, instantly adjusted to the job without reaching. The **BOLT-ACTION STOCK STOP** for duplicate lengths.

Note too, the **HEAVY, STIFF BOX-SECTION GUARD** and running gear sup-

port. The **LARGE 16" BAND WHEELS** which allow extra capacity with little twist of saw blade. The **GENEROUS CAPACITY**—10" HIGH, 18" WIDE—enough for almost any cut-off job, on any shape work. The **HYDRAULIC FEED CONTROL** which, with the quick-adjustable slide weight, maintains correct blade pressure. The **EXTRA THIN BLADE**—.032"—which removes less stock, and does it faster and more accurately.

These are just a few of many exceptional features that are everywhere proving the profit-making qualities of this machine.

The **JOHNSON** **METAL CUT-OFF BAND SAW**



Wet cutting attachment available—also casters for quick portability. Complete details in catalog just off the press. Write.

JOHNSON MANUFACTURING CORP.
616 CHRYSLER BLDG.,
NEW YORK 17, N. Y.

**HAVE YOU
A JOB OR A
REAL PROBLEM
in the
Circular Sawing
of Metals?**

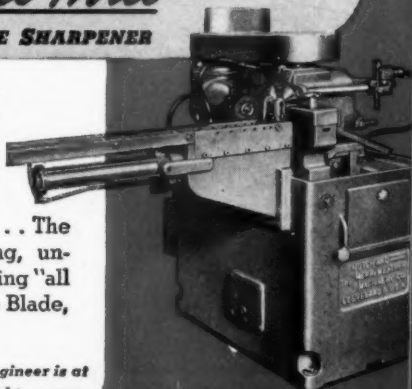
*-the Answers
are Here!*

*Triple-
Chip
METHOD*

**Without Cost or Obligation you may draw upon
an Extensive Fund of Data gathered from Many Years'
Experience in "Building All Three"**

CIRCULAR SAW • SAW BLADE • BLADE SHARPENER

What size machine will deliver the best results? Do you need a full automatic, semi-automatic or plain type? What size blade is required? What speeds and feeds should be used? What production can you expect on this job? What should your cut-off cost be? And so forth. . . The answers, sir, are here, springing from a long, unparalleled experience in building and correlating "all three": Circular Sawing Machine, Triple-Chip Blade, Triple-Chip Blade Sharpener.



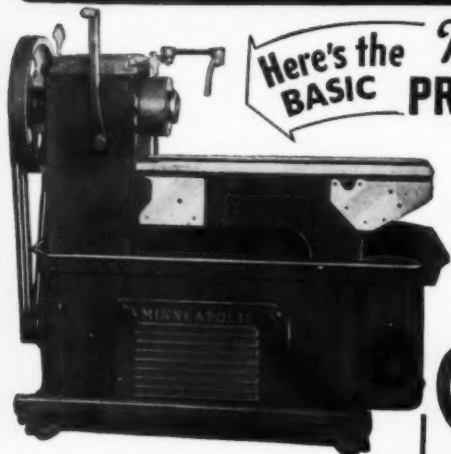
**No. 30
Automatic Circular Saw**

**A Motch & Merryweather sales engineer is at
your service to give you the one right answer.**



**THE MOTCH & MERRYWEATHER MACHINERY CO.
PENTON BUILDING CLEVELAND 13, OHIO**

How to Save Money on PRODUCTION LATHES



Here's the
BASIC

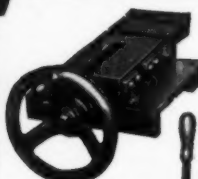
Minneapolis
PRODUCTION LATHE

—and you can hold down your cost by adding only the equipment needed for your particular production job.

EXTREMELY ADAPTABLE for any production set up. With the Minneapolis "BASIC UNIT-PLUS-PARTS" Plan, you have a high-speed, heavy duty production lathe "tailor made" for your requirements. Any additional equipment can be added as needed, plus many other practical attachments not shown here.

HEAVY CUTS WITHOUT "CHATTER"—simplified design and ease of control enable inexperienced operators to turn out high speed volume production. Excellent for second operation work.

A QUALITY LATHE at an ECONOMY PRICE—With the Minneapolis "BASIC UNIT-PLUS-PARTS" Plan you get 2 1/4" collet capacity—14" swing—heavy duty spindle assembly—performance that will successfully compete with much higher priced turret lathes. Write us your production problems—send sample part or drawing—let us quote you on a lathe exactly suited to your work.



Cross-Slide—
Hand screw feed
and lateral stops.

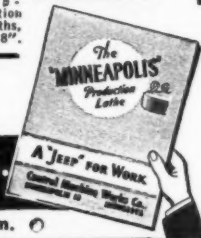
Cross-Slide — Rack
and Pinion Feed and
lateral stops.



Six Station flat
Turret and Self-
indexing stop.

Carriage —
Manual Cap-
stan operation
— 3 lengths,
12", 16", 18".

**WRITE FOR
BULLETIN**



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Machinery Designers and Manufacturers Since 1890

1254 Central Ave. N. E.

Minneapolis 13, Minn.

INGERSOLL *Shear Clear*

Carbide Tipped **FACE MILLS FOR HIGHER FEED RATES MILLING**
• Iron • Aluminum • Steel



FINISHING CAST IRON



ROUGHING CAST IRON



ROUGHING STEEL



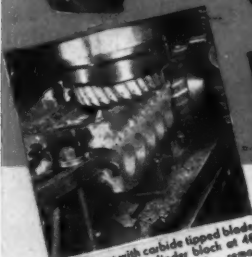
ROUGHING CAST IRON



ONE CUT ALUMINUM



FINISHING CAST IRON



Shear Clears with carbide tipped blades milling cast iron cylinder block at 48" per minute feed, \$75 ft./min., removing 1/8-3/16" stock.



Note how Shear Clear chip is forced to coil out along the blade away from finished surface and is thrown clear of corner at end of cut. This action produces smoother finish, faster feeds, longer tool life, and less power requirements.



Milling SAE 8330 test block with 10" diameter Carbide tipped Shear Clear. 3/4" stock, 8" wide cut, 300 ft./min., 16" feed, 105 horsepower.

The Ingersoll patented Shear Clear face mill is now available with special angles for milling either cast iron, aluminum, or even steel with carbide tipped blades. It is now possible to mill steel with positive angles using carbides if there is sufficient rigidity in machine and fixture.

Carbide cast iron Shear Clears are now milling cylinder blocks, crank cases, transmission cases, flat irons, etc., at feed rates up to 48" per minute, and special cutters can be designed for

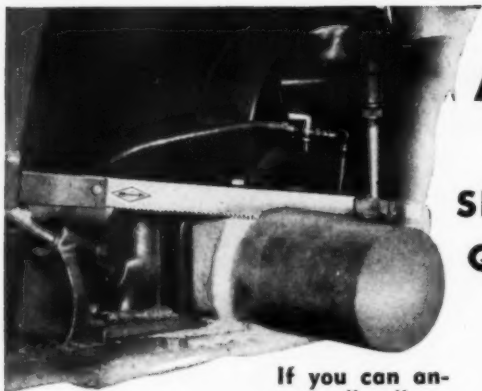
higher feed rates if power is available.

Feed rates and cutting speed are almost unlimited with Ingersoll carbide tipped Shear Clears milling aluminum. Machine rather than cutter is limiting factor.

The steel carbide Shear Clear is particularly intended for rough and finish cuts on steel weldments. The unique combination of cutting angles controls chip flow and protects entering angle to maintain cutting edges on carbide tip.

Write for Catalog No. "55E" describing these and other Ingersoll inserted blade milling cutters with high speed steel, cast alloy, or carbide tipped blades.

THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILLINOIS



Can You Answer "Yes" TO THESE SIX IMPORTANT QUESTIONS?

If you can answer "yes" to all six, then you can be sure your production hack saws are operating most efficiently. The Barnes Hack Saw Production Calculator (free on request) has information that will enable you to answer "yes" to some of these questions; Barnes Service Engineers can give you the correct answers to all of them!

Why not let us match our top quality hack saw blade plus our knowledge of metal sawing against your cutting problems. Then you are assured your production power hack saws will deliver maximum cutting efficiency.



Your Barnes Distributor will have a Barnes Service Engineer call on you whenever you say—no obligation.

- 1** Am I obtaining maximum number of square inches cut per blade?
- 2** Am I using correct feed and speed to balance production against tool cost?
- 3** Do I use correct length and pitch of blade for size and type of material being cut?
- 4** Am I nesting materials in the most efficient manner?
- 5** Am I cutting my material in the shortest possible time consistent with normal blade life?
- 6** AM I USING THE RIGHT BLADE?

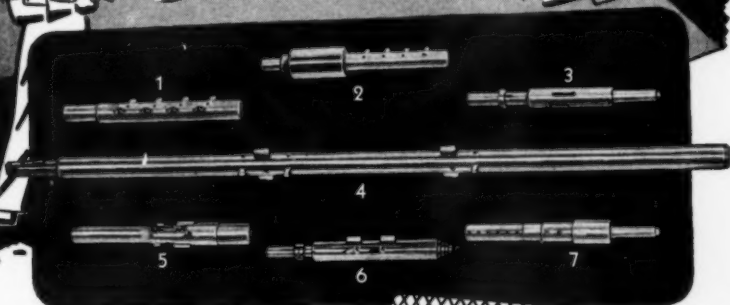


ESTABLISHED 1919

W. O. BARNES CO., INC.

DETROIT 14, MICHIGAN

Cut BORING Costs with these Different DAVIS Tools



PRODUCE MORE PARTS FASTER ON YOUR PRESENT EQUIPMENT WITH DAVIS BARS HAVING EITHER SINGLE OR MULTIPLE CUTTERS

These different standard and special Davis boring tools perform numerous operations when used on vertical and horizontal machines. They produce more parts for you faster and at less cost. Simplicity of setting block type cutters and fly cutters in the bars reduces set-up time to a minimum. Then, too, it is often possible to rough, semi-finish and finish bore in a single pass of the tool.

Rigid construction of Davis boring tools permits increasing speeds and feeds and at the same time improves machining accuracy. Depend upon any Davis boring tool to handle difficult work easier and better and to give maximum performance on either standard or special work.

PROFIT PRODUCING DAVIS TOOLS

- ① Super Micrometer Flycutter, for Cam or Crank Boring.
- ② Adjustable Multiple Flycutter with Roller Pilot.
- ③ Recessing Tool for Internal Operations.
- ④ Line Boring Tool—for Universal Use.
- ⑤ Micrometer "L" Type Straight Through and Bottom Boring Tool.
- ⑥ Straddle Facing Tool.
- ⑦ Block Type Boring Tool for Two Diameters and Counterboring with Wear Strips on Front Pilot.



NOW

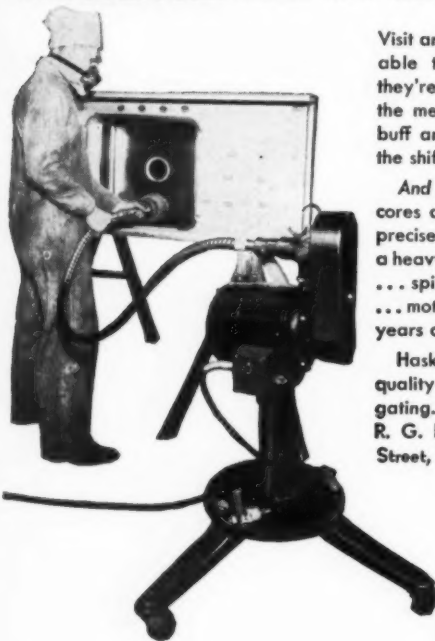
DAVIS BORING TOOL DIVISION OF
Giddings & Lewis Machine Tool Company
144 Doty Street, Fond du Lac, Wisconsin

is the time to obtain worthwhile ideas on production boring. Ask for the Free Davis Production Data Folder BB-67.



FIRST to Go... LAST to Stop!

haskins tools are useful 'round the clock!



Visit any fabricating plant where Haskins portable tools are used—and watch the uses they're turned to! In every stage of fabrication, the men use the Haskins to grind, file, sand, buff and polish—it keeps working throughout the shift.

And it's built to do just that! Flexible shaft cores are of Swedish high carbon music wire, precisely wound and used in combination with a heavy-duty, reinforced, rubber-bound casing ... spindles are built with tool-room accuracy ... motors give constant flow of power through years of steady service.

Haskins flexible shaft machines offer you a quality and usefulness that are worth investigating. Do that—now! Ask for Catalog No. 45. R. G. Haskins Company, 2645 W. Harrison Street, Chicago 12, Illinois

HS-4; widely used in fabrication of all steels; 1/2 h.p. multi-speed, countershaft unit, 1500 to 7800 R.P.M., mounted bench height on caster base, 360° swivel. One of many models.



haskins

FLEXIBLE SHAFT EQUIPMENT

THOR GRINDERS LAST LONGER!

the *Thor*

"Shock-Absorber" Spindle

**PROTECTS THE MOTOR
AGAINST VIBRATION**



You'll get more work—
faster—with this THOR
HEAVY DUTY ELECTRIC
GRINDER . . . Its exclusive "Shock-
Absorber" Spindle assures longer useful
life—a real economy in grinder service. Ask
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BRANCHES IN PRINCIPAL CITIES

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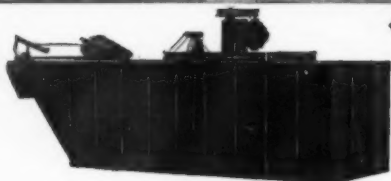
PORTABLE POWER

TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY
ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

IN PLANT AFTER PLANT *users say:*

"H O F F M A N
*filtration equipment pays
for itself in
maintenance savings"*



VACUUM FILTERS

Hoffman vacuum filters increase production, enhance precision finish — and lengthen life of machines, cutting tools and grinding wheels. Variety of sizes, many self-cleaning.



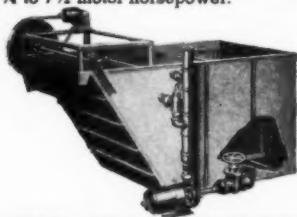
PRESSURE FILTERS FOR FINE FILTRATION

Designed for use with approved filter-aid powders Hoffman Pressure Filters are widely used for finest clarity filtering of straight oil coolants . . . especially those of heavier viscosity.

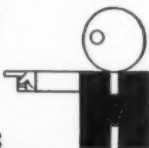
PLUS coolant temperature control units and vacuum stills for solvent recovery . . . and a specialized engineering service to solve your filtration problems.

◀ FLOTATION EQUIPMENT

A new simple process which is entirely mechanical . . . no added material is necessary. Particles are aerated out of dirty coolant — discharged into sludge receptacle automatically. Compact design. Cells from 18 to 66 inches, and from $\frac{3}{4}$ to $7\frac{1}{2}$ motor horsepower.



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**MACHINERY
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215 Lamson St., Syracuse, N. Y.

COOLANT FILTERS • FILTRATION ENGINEERING SERVICE

**TOP
QUALITY**

Modern COLLETS...

—ALL Types and Sizes

—For ALL Machines



MODERN Collet & Machine Company—the leading independent collet manufacturer for more than 20 years—maintains a tremendous stock of precision collets for all screw machines, lathes and milling machines. All commonly-used types and sizes can be shipped immediately from stock—and the few remaining items are available on 10 days delivery or better.

**ON
EXTRA-FAST
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All Modern collets are made of special chrome-nickel steel, heat treated for maximum springiness and wear resistance and finished to guaranteed accuracy. Their original sound basic design has been steadily improved throughout the years to assure the utmost in performance and dependability.

For the best in quality and for extra-fast service, call on *Modern Collet* for all of your collet requirements.

For more than 20 years America's leading independent manufacturer of collets, pushers and screw machine replacement parts.

Catalog 47 gives full details on these and other Modern products. Write for a copy!



MODERN COLLET & MACHINE CO.

405 SALLIOTTE STREET • ECORSE 18, MICHIGAN

These IMPORTANT FEATURES of



REG. U. S. PAT. OFF.

KNURLED SOCKET HEAD CAP SCREWS

SPECIALLY MACHINED BROACH

UNIFORM SOCKET DEPTH

CONTINUOUS GRAIN FLOW

NATURAL FINISH NO MACHINING
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ALL STEEL MAGNETICALLY INSPECTED

ALLOY STEEL

CLOSE TOLERANCE ON DIAMETER

GRAIN FLOW ON ROLLED THREAD

KNURL CAN BE USED FOR
LOCKING PURPOSE

KNURLED FOR FAST ASSEMBLY

CONTROLLED FILLET

SMOOTH BODY

CONTROLLED THREAD TERMINATION

PRECISION ROLLED THREAD
CLASS 3rd FIT

Give you these OUTSTANDING ADVANTAGES

STRENGTH, TOUGHNESS, RELIABILITY

... the result of constant testing, inspection and quality control.

KNURLED HEAD FOR EASY ASSEMBLY

... the knurled head provides a slip- and fumble-proof grip, even for the most oily fingers, therefore, the screw can be screwed-in faster and farther before it becomes necessary to use a wrench.

We also make the famous "Unbrako" Socket Set Screw with the "Self-Locking" Knurled Cup Point, and the "Unbrako" Socket Set Screw with the "Self-Locking" Knurled Threads.



OVER 44 YEARS IN BUSINESS

EASY START THREAD POINT . . .
specially designed to assure fast, easy thread start.

INTERNAL WRENCHING . . . to promote Compact Designs which save space, material, weight and costs. Write for your copy of the "Unbrako" Catalog.

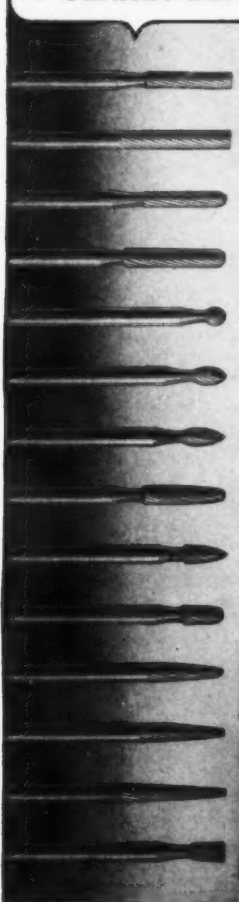
"Unbrako" and "Hallowell" Products are sold entirely through distributors.

Knurling of Socket Screws originated with "Unbrako" in 1934.

STANDARD PRESSED STEEL CO.

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NEW
P&W KELLER
1/8" Carbide Burs



Meet the **T O U G H** **R U N T S**

*Order any or all of
them—or our boxed
Kit of any Six Shapes*

Recent addition to the tough Carbide Keller Bur Family are these 14 little fellows. Already they've proved their talents. They tackle anything up to 65 Rockwell C. They wade through cast iron and machine steel as if it were cheesecake.

They're master-ground from solid carbide . . . they always run uniformly true—always give top performance when run at not less than 25,000 R.P.M. and preferably faster.

We want you to know them better. So order any of them or try a kit of six (your choice of 14 shapes illustrated, in a handy box).

Let them go to work to prove their worth, in your shop. Just what you're looking for? Then act today.



PRATT & WHITNEY
Division NILES-BEMENT-POND COMPANY
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Many Problems in Motion Can be Solved by the Use of **AIR as POWER**

No longer is the use of air power in many machine operations prohibitive because of slow action, massive bulk and limited stroke, not to mention the all important factor of economy.

Fenn custom-built air cylinders eliminate the traditional objections to the use of standard air cylinders. For instance —

FENN does not manufacture a line of standard air cylinders.

FENN does design and produce in any quantity air cylinders to do a specific job efficiently and economically. FENN Custom-Built Air Cylinders provide accurate control of the piston velocity curve; they can be cushioned at either or both ends of the stroke; valves can be integral.

FENN cylinders will frequently deliver greater power from available air pressure with savings of space and with valuable air economy. Write us about your particular problem.

**Look at the Specifications of This
Air Cylinder Custom-Built by FENN.**

O.D. 11/16"
STROKE 42"
Speed 60 CY/MIN
VALVE INTEGRAL



The **FENN** *Manufacturing
Company*

HARTFORD • CONNECTICUT,
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GOOD NEWS TRAVELS FAST

GOOD NEWS-O-GRAM

April 30, 1947

To the Machine Industry

ANOTHER POWER-FLO ACHIEVEMENT HAS BEEN ANNOUNCED

A NEW VERTICAL DRIVE WITH ADJUSTABLE SELF-SEALING GLAND THAT PROVIDES POSITIVE OIL LEAKAGE CONTROL AND POSITION-LOCKED BEARINGS AND SHAFTS PROVIDING THRUST AND END-PLAY CONTROL IS NOW AVAILABLE.

ESPECIALLY ADAPTABLE TO VERTICAL MILLS, PROFILERS, DIE SINKERS, AGITATORS, MIXERS OR ANY MACHINE WITH VERTICAL SPINDLE OR DRIVING SHAFT.

POWER-FLO VERTICAL DRIVES MAY BE DIRECT COUPLED OR THEY WILL DRIVE THROUGH V-BELTS, FLAT BELT OR CHAIN AND SPROCKET WITHOUT BEVEL GEARS OR TWISTED BELTS.

MACHINE BUILDERS AND USERS EVERYWHERE ARE INVITED TO WRITE FOR FULL INFORMATION ABOUT THEIR SPECIFIC REQUIREMENTS.

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P.O. Box 303 E. Detroit, Mich.

**Immediate
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Precision Built

**MACHINE DRIVES
½ HP to 20 HP**

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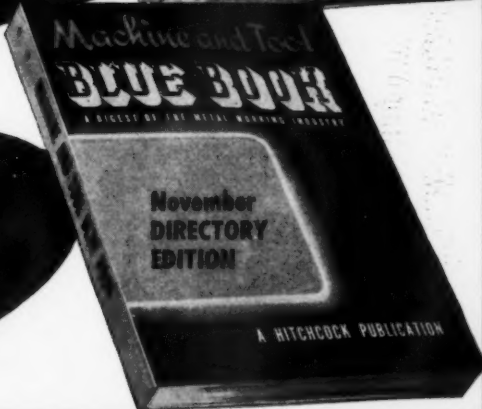
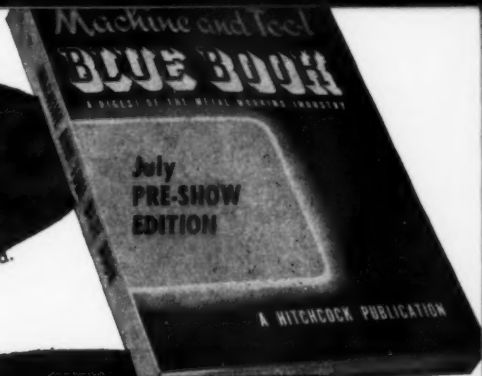


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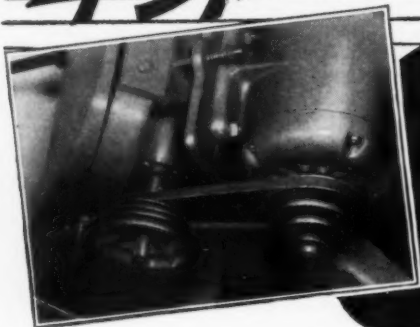
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A Speed Drive

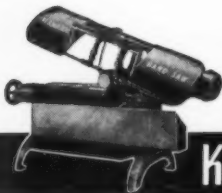


*a Feature
of the*
**Kalamazoo
Metal Cutting
BAND SAW**

You can cut tubes, solids, hard or soft materials on the Kalamazoo Metal Cutting Band Saw. Speed changes are quickly made by slipping belt from one position to another on the step pulley. Hinged motor mount tilts back for instant belt adjustment.

Four different speeds available — so practically every cut-off job in your plant can be handled accurately and fast — including many now being done on high priced equipment.

Ask your dealer or write direct for complete information.



MACHINE TOOL DIVISION

Kalamazoo Tank & Silo Co., Kalamazoo, Michigan

In Canada — Bridge Machinery Co. — Montreal

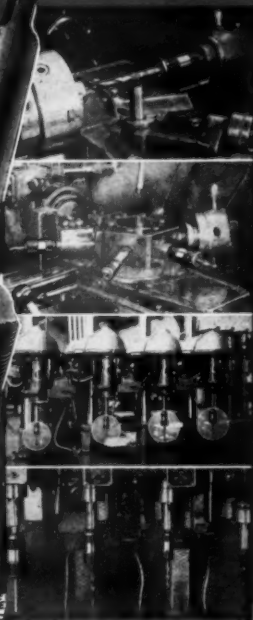
Kalamazoo Metal Cutting Band Saw

SAVE TIME

STEP UP PRODUCTION!

"KNOCK-OUT" CHUCKS ARE
FAST • POSITIVE • NON-SIP

A twist of the wrist tightens or loosens this self-energizing chuck. The heavier the workload the tighter its hardened jaws grip the tool with a radial pressure that prevents twist or slip. Its fast, positive action saves time—saves tools—steps up production.



"KNOCK-OUT" EXPANDING MANDRELS
STEP UP PRODUCTION ON TURNING,
MILLING AND GRINDING OPERATIONS

SIMPLE—FAST—ACCURATE. "Knock-Out"
Expanding Mandrels hold work from $\frac{3}{4}$ " to $5\frac{1}{2}$ "
hole. Perfect support without distortion for thin wall
sleeves—sure, positive grip on heavy pieces. Ideal for
production or tool-room.



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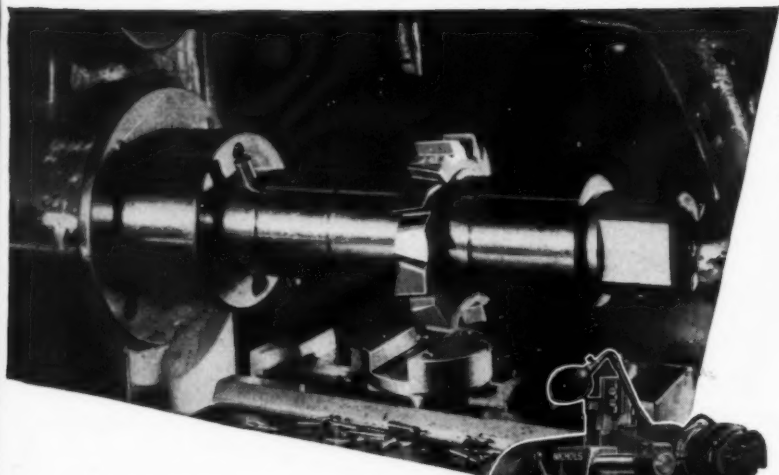
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IF YOU *have* A TOOLROOM OR LABORATORY
YOU *need* A NICHOLS TOOLROOM MILLER

Everybody who has a toolroom or laboratory can use a Nichols Toolroom Miller. And there's good reason—for the Nichols Miller, arranged for the toolroom, is more than just an ordinary milling machine. In addition to conventional milling, the Nichols can do grinding, turning, boring, and, by virtue of its unique rise-and-fall spindle, contour milling and broaching.

The extremely precise operation that you expect is easily obtainable on the Nichols Toolroom Model. Hand wheels, with large adjustable micrometer dials, provide for extremely fine longitudinal and transverse feeds. An extra large hand-scraped table (8" x 30"), with three T-slots, insures rigid set-up of long, light pieces requiring cuts up to 19" in length. These, plus the basic features included in all Nichols Millers—hardened and ground spindle mounted in preloaded bearings, heavy box-sectional knee with long, hand-scraped dovetail slides, accurate feed screws—combine to provide productive capacity that will meet the closest tolerances demanded in your toolroom or laboratory.



For more complete details on this versatile machine that "uses its head" to produce unusual forms accurately and with fine finish, send for the Nichols Miller Catalog.



T H E *Nichols* **M I L L E R**

MANUFACTURED BY W. H. NICHOLS COMPANY, WALTHAM 54, MASS.
NATIONAL DISTRIBUTORS: NICHOLS-MORRIS CORP., 42-A CHURCH ST., NEW YORK 7, N. Y.

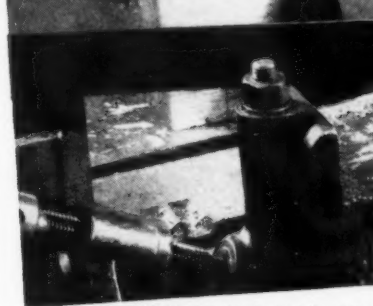
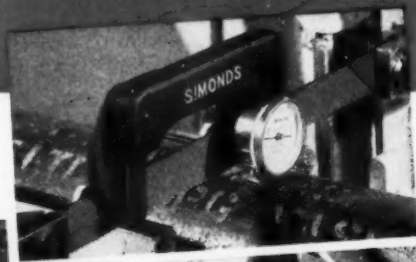
SIMONDS

Provides these

2 Extra Aids

to make sure all users
get Smoother Cutting and
Longer Life from all

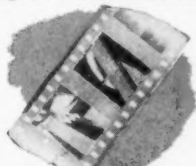
"RED END"
Hacksaw Blades



BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 416 W. Eighth St., Los Angeles 14, Calif.; 228 First St., San Francisco 5, Calif.; 311 S. W. First Avenue, Portland 4, Ore.; 11 W. Trent Ave., Spokane 8, Wash.; Canadian Factory: 595 St. Remi St., Montreal 26, Que.

1. New Educational Motion Picture. Designed to take a new operator through the various steps in the proper use of both hand and power-machine hacksaw blades. It helps him select the right blade for different cutting jobs and the correct methods of operation in order to get greatest efficiency and longest blade life.

This 16 mm. film, with color and sound, will be interesting and helpful to experienced operators also, because it actually shows how hacksaws cut. And it explains the new technique of hacksaw tensioning which has helped many plants to get greater cutting efficiency. Showings may be arranged through the nearest Simonds office.



2. "SIMOMETER" Eliminates Guesswork in Hacksaw Tensioning. This new device saves costs by eliminating guesswork when tensioning blades. Attached directly to any blade, the "SIMOMETER" avoids inaccuracies due to friction of blade holder, or to varying thread pitches of tightening devices. Ask your Industrial Supply Distributor for a demonstration.

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SAW AND STEEL CO.

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WONDERING WHAT'S HAPPENING TO YOUR POWER?

YOU'RE probably paying plenty for power . . . whether you make it or buy it. So, why not get as close to 100% efficiency as you can in your power transmission from source to machine? You can do it with

CONWAY CLUTCHES

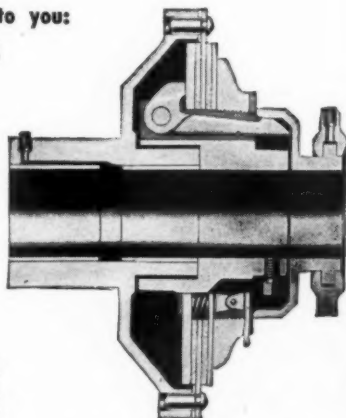
(Patented U.S.A. and Canada)

Think what these features mean to you:

- ★ INTERCHANGEABLE PARTS
- ★ STANDARDIZED PRODUCTION
- ★ LARGER CLUTCHES IN SEVERAL MODELS
- ★ BETTER DELIVERIES
- ★ BUILT OF BASIC MATERIALS

Write for bulletins on these clutches:
Single plate stud drive, tandem plate stud drive, double, disc, gear tooth drive, sheave, compression, one revolution, XYZ type and sleeve type.

Ask also for Bulletin L15.



*Illustrated is phantom view of
Conway Disc Clutch*

THE CONWAY CLUTCH CO.

**NEW LOCATION: 2745 Colerain Avenue
CINCINNATI 25, OHIO**

CUTS TWICE AS MUCH STOCK... REDUCES BLADE COST 75%

SawMore

Actual running conditions proved the installation of SawMore Machines cut a manufacturer's* blade cost 75%. This was accomplished by SawMore Machines handling more than twice the amount of stock cut by previous saws. Materials that usually meant high blade cost... materials ranging from new to used stock including I beams, channel, pipe, tubing, bar stock, flats, etc.

Enthusiastic users the nation over have found that SawMore Machines improve work quality—lead the way in extremely high cutting accuracy... slash production costs.

SawMore features which make these records possible are:

- 4 cutting speeds—65, 93, 120, 149 strokes per minute
- Self-aligning blades
- Automatic feed
- Gears in constant mesh—reduce backlash to minimum
- Spacer Bar which may be set for individual or multiple length.

*Name of manufacturer sent on request.

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Clark Street Maquoketa, Iowa

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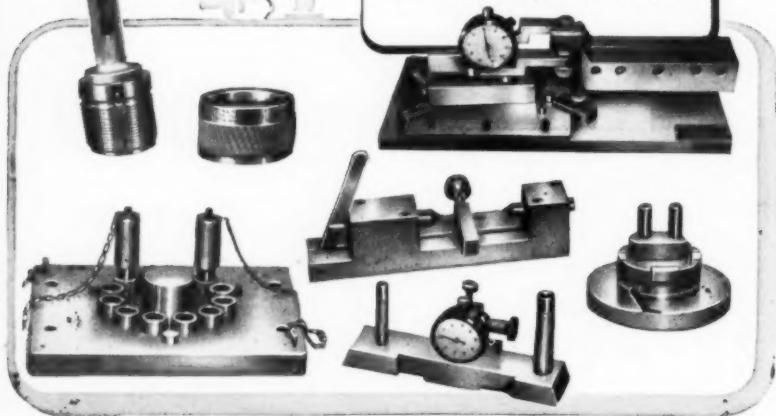
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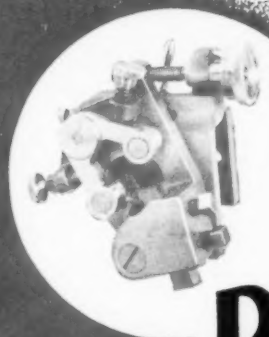
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... SPECIAL GAGES or tools, fixtures and parts built to closest precision limits? Lincoln Park has a department devoted exclusively to special work. Here are combined the experience of skilled gage makers and the facilities of one of the country's finest gage plants. We'll be glad to supply full details as to the type of work that can be produced here for you.



 *Lincoln Park* INDUSTRIES, INC.
1731 FERRIS AVENUE • DETROIT 25, MICHIGAN

MICROMETER ADJUSTMENT
ELIMINATES "GUESS WORK"



Biltmore

- 1 Can be fitted to any Turret Lathe.
- 2 Requires only about 10 Seconds to "set" Cutter for each new cut.
- 3 Cutter will take sharper edge.
- 4 Cutter will last 60% longer.
- 5 Dial control also serves as "tool release" on backing off.

SINGLE CUTTER ADJUSTABLE TOOL HOLDER

A turn of the Adjustment Dial one graduation moves the Cutter exactly 1/1000th of an inch, and instantly locks in place. Speed and accuracy control maintained. The Cutter is nearly in a vertical position. The cutting edge is "with" the END GRAIN of the steel, therefore, your Cutter will take a sharper edge, and last 60% longer. The Dial screw is on the fixed base plate. It actuates the cutter plate, which moves on a pivot.

Turn the dial clock-wise to set Cutter "in". Turn the dial counter-clock-wise on backing off.

Size B $\frac{1}{4}$ " to $1\frac{1}{2}$ ". Immediately Available.

Dealers: Some territories still open.

*"Biltmore
Builds More
Production"*

HOUSE OF COMMERCE

905 HAMMOND BUILDING

DETROIT 26, MICHIGAN

from FLAT SURFACES

TO INTRICATE SHAPES



with the New
**DI-ACRO
BRAKE**

- **ROK-LOK**—new sensitive material clamp increases accuracy
- **DOUBLE-EDGED FORMING BLADE** allows close reverse bends
- **NEW PRECISION STOPS** accurately control angularity of bends

This versatile metal forming machine was developed for use in model shops, experimental laboratories and production departments where it often replaces dies for all types of precision forming operations. Di-Acro Brakes will form a great variety of materials including copper, bronze, stainless steel, aluminum and bi-metals.

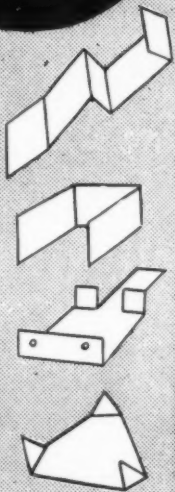
WRITE FOR CATALOG. New edition of 40-page Di-Acro Catalog contains detailed information on all Di-Acro Brakes, Shears, and Benders and illustrates how these precision machines can be used individually or cooperatively for "DIE-LESS DUPLICATING".



◀ DI-ACRO is Pronounced "Die-Ack-Ro"

O'NEIL-IRWIN MFG. CO.

314 8TH AVE., LAKE CITY, MINNESOTA





THEY FLOAT

EMPIRE TAP HOLDER

Corrects for both parallel and angular misalignment—floats freely in and out—will not freeze under tension caused by drag of tap.

EMPIRE REAMER HOLDER

Compensates for parallel and angular misalignment or combinations of both—floats in all directions—so holes are always reamed to close tolerances—without bell mouths.

Scrap is eliminated, since both holders will automatically assume original setup when tools are replaced after sharpening—thereby also increasing life of reamers and taps.

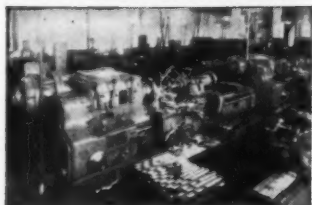
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77

For Speed, Economy and Range THE HENDEY 4C MANUFACTURING LATHE



The Hendey 4C Manufacturing Lathe is fast, precise and economical. It is capable of handling a wide range of turning, boring and threading jobs on either a long or short run basis. The 4C is functionally designed to make operation simple. A unique change gear train provides a maximum of feeds and speeds with the minimum number of controls. The use of selected materials, plus the precise testing of all parts and assemblies in the 4C, insures smooth, accurate production. All gears are made of hardened alloy steel, machined and shaved to the closest tolerances. The spindle rides in selected super-precision preloaded bearings. Ample provision for fast stopping and starting is furnished by a large multiple disc clutch and a cone brake. And, of course, the 4C has a Hendey precision lead screw accurate to $\pm .001$ " per foot of lead. The spindle collar is accurately graduated to make multiple threading easier. Also the 4C has an automatic lubrication system that practically eliminates the maintenance problem.

In fact, if you want a manufacturing lathe that has the rigidity, sensitivity and accuracy to produce work ranging from long shafts to twist drills with speed and economy, you need look no further than the Hendey 4C. Write for complete information today.

The Hendey Machine Company

Main Office and Plant — Torrington, Connecticut

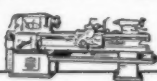
Offices — N. Y., Chicago, Boston, Detroit, Rochester, Los Angeles, San Francisco

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Hendey

TOOL ROOM LATHES

12" - 14" - 16" - 18" - 20"



SHAPERS

12" - 14" - 20"



Tops in 1879...

Still The Leader For 68 Years



**HARGRAVE
CLAMPS**



New Hargrave Carriage Clamp, stronger — more durable than malleable. Openings from 3 in. to 8 in.

When a line of tools leads the field in sales to industry for close to three-quarters of a century, there must be good reasons for it. And here they are:—

1. Constant improvement since 1879 with the aid of skilled mechanics from noted firms.
2. There is a Hargrave Clamp for every application.
3. A progressive manufacturing policy ever alert to new ideas and developments.

Constructed to take it, Hargrave *Individually Tested* Clamps insure top performance for maximum production.

WRITE FOR CATALOG showing the complete line of Hargrave Clamps—from 3/4 in. to 10 ft. openings, from 1/2 in. to 16 in. deep; also Chisels, Punches, File Cleaners, Washer Cutters, Brace Wrenches, etc.

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Cincinnati 12, Ohio

The CINCINNATI TOOL Co.



**No. 40 Forged Steel
Super Clamp
Heavy Service**



**No. 44 Forged Steel
Super Clamp**



DESIGN

A complete engineering service, backed by an experienced staff, is at your service to make recommendations and design special cutters.



RANGE

Hundreds of sizes, dozens of models to meet every requirement, regardless of machines used or materials to be cut.



SERVICE

Even special tools use standard parts, which are stocked by us. There are 30 Lovejoy service centers throughout the U.S.A.—there is one near you.

30 YEARS' SATISFACTION

Nearly 30 years' continuous operation making milling cutters and other "Positive-Loading" tools. Our first customers are still buying our tools.



The right tool for the job often means a special tool and that usually means an expensive tool. But **not** when you come to Lovejoy, because specials are our specialty—and we offer something extra special when it comes to designing and making them.

Part of that extra-special something is the fact that all our custom-made tools use a majority of **standard** parts. They are built around the famous Lovejoy positive-blade locking device and use Lovejoy interchangeable blades. This means lower initial cost, longer blade life, faster, more accurate production and simpler maintenance. The rest is made up of our nearly thirty years of experience in designing and making all types of inserted-cutter tools and a nationwide service organization that's of real value to owners of Lovejoy special tools, because Lovejoy specials have so many standard parts.

For a few examples of Lovejoy specials, see the illustrations above. They include a rugged dovetail cutter, two face mills—one 24" in diameter, the other 2 1/4" in diameter, a special boring head, and a husky slotting cutter. All use interchangeable carbide-tipped Lovejoy blades.

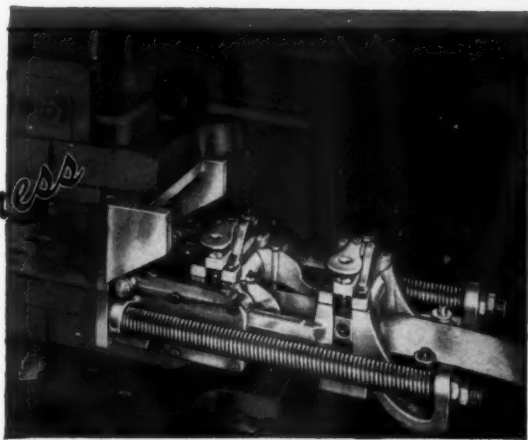
If your work requires special cutters, you can make no better move than to send your problem to Lovejoy, because specials are our specialty.

ALWAYS SPECIFY LOVEJOY

LOVEJOY TOOL COMPANY, INC.
SPRINGFIELD, VERMONT, U. S. A.

*Replace
Worn
Punch Press
Feeds*

with the
New Improved



DICKERMAN DIE FEEDS *at Considerable Savings*



*Write
Today!*
For this new
Catalog

Dickerman Die Feeds cost much less than old-fashioned feeds and do more accurate, faster work.

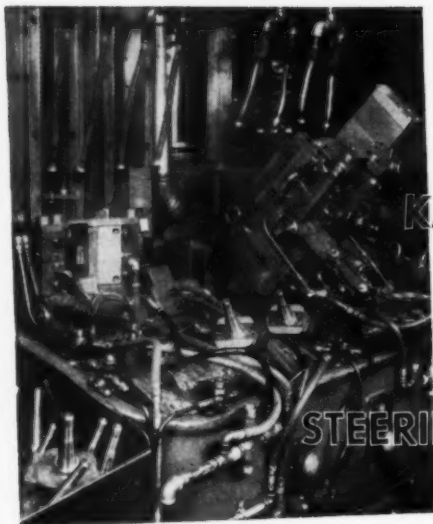
They are interchangeable — can be mounted on any type punch press.

Their flexibility allows for feeding stock from any angle — front, back, left and right of punch press.

Maintenance expense is negligible due to the absence of wearing parts, also their accurate and rugged construction.

Send for free illustrated catalog today and get acquainted with profit-making Dickerman Die Feeds.

H. E. DICKERMAN MFG. CO.
281-52 ALBANY STREET • SPRINGFIELD, MASS.



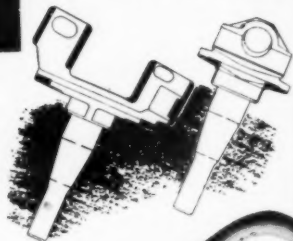
MICHIGAN
TOOLED
KAISER-FRAZER
 FOR
Complete Broaching
 OF THIS
STEERING KNUCKLE

*Broaches, Broach Holders and
 Pneumatic Fixtures were designed,
 built and followed in Production
 by Michigan*

Illustrated is one of 4 machines equipped by Michigan. Shows dual ram set up with pneumatic fixture at left in operative position, fixture at right in loading position. 16 surfaces and the king pin hole are broached to final finish in five passes.

What makes this a story? Just that Michigan can do the same for you—start with the part print and machine and place the job in production.

Let Michigan quote on your next job



**MICHIGAN WILL also DO
 THE COMPLETE MACHIN-
 ING OF YOUR PARTS**

Michigan is also equipped with the largest machine shop of its kind to machine and broach production parts for you.



MICHIGAN  **BROACH CO.**

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DETROIT 4, MICHIGAN

TOOLS THAT EARN THE TRUST *of skilled machinists*



Universal Bevel Protractor shown measuring small angle is No. 496 with Acute Angle Attachment. Directly above is No. 495.

We urge buying through the Distributor

WHEN A MACHINIST lays out or establishes an angle with a Brown & Sharpe Bevel Protractor he has complete trust in the accuracy of a fine tool. That trust, whether inherited from an older craftsman, acquired from everyday use or even from apprenticeship days, has been earned by the superior performance of Brown & Sharpe Tools—by excellence of design and workmanship. This trust is an intangible quality that adds a very tangible extra value to the tools themselves—that makes each purchase of Brown & Sharpe Tools a satisfying, wise investment. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

BROWN & SHARPE TOOLS



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Free-Operating
...Accurate!*

**IT'S A LEMPCO
PRECISION
ANTI-FRICTION
DIE SET**

For increased die life . . . faster production . . . greater economy . . . put Lempco Anti-Friction Die Sets to work for you.

Lempco Die Sets are equipped with ball or roller bearing guide pins. As a result, dies can be set up by hand without the use of hammers, mauls, jacks or pry bars. This eliminates production delays caused by accidents to dies and punches . . . saves up to 60% of die setter's time . . . means extra profit for you.

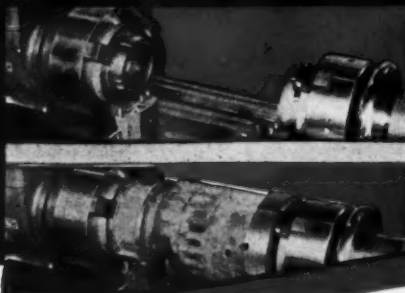
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LEMPCO

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● Write for "Facts About Lempco Precision Anti-Friction Die Sets." It's a fully illustrated catalog which lists all the advantages Lempco Die Sets have for you.



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Quickly and Accurately with**

DUAL "LOGAN" CHUCKS

**Diesel Engine Cylinder Liner
Held in Air-Operated Chucks
on Sundstrand Automatic Lathe**

Fast, precision chucking of this large cast-iron cylinder liner is obtained with dual Logan air-operated chucks, controlled from a single valve. The workpiece is held in a 3-jaw driving chuck and a duplex type tailstock chuck with 2 pairs of jaws operated independently to facilitate loading.

Your chucking applications can be handled with similar effectiveness on standard Logan air or hydraulic operated chucks. Production is increased

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To accurately position and clamp the part, Logan rotating air cylinders actuate both chucks on this job. A tandem type cylinder provides independent control of each set of jaws on the tailstock chuck. Logan rotating air cylinders are available in standard sizes to fit most applications; special bore and stroke furnished to specifications.

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Ask for catalogs and engineering advice on air and hydraulic operated chucking systems. No obligation.



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Air and Hydraulic Equipment

LOGANSPOORT MACHINE CO. INC.

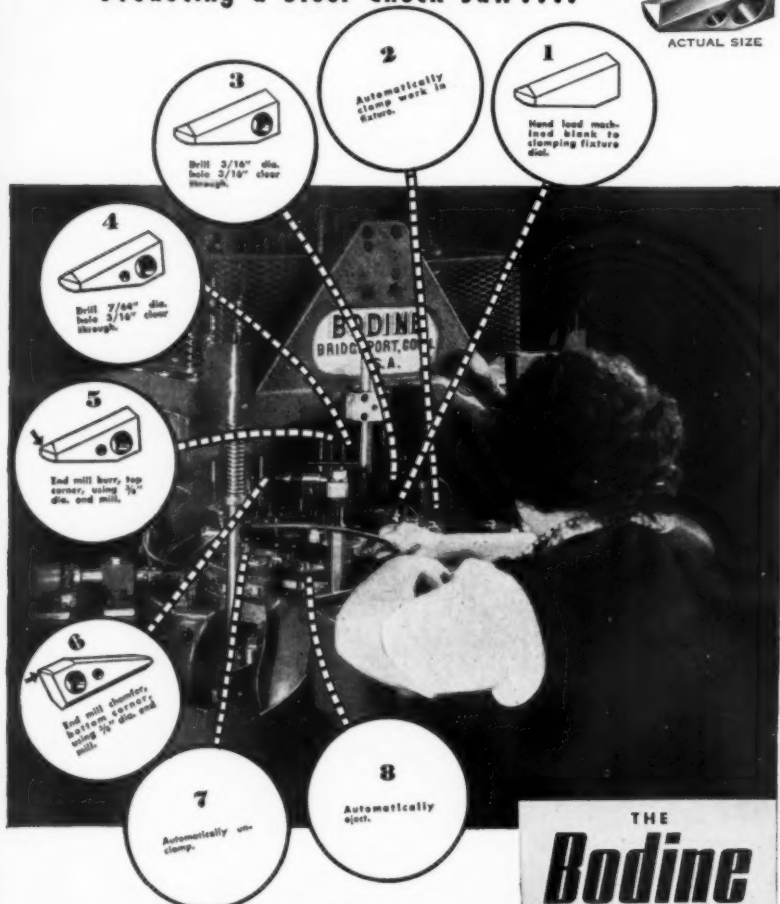
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Indiana

CHUCKS - CYLINDERS - VALVES - PRESSES - BORE - FLOW - COOLANT - PUMPS

SAVES
TIME
EFFORT
MOTION

Bodine...Case History No. 15

Producing a Steel Chuck Jaw....



This Bodine automatic Multi-spindle, horizontal dial machine is producing 550 pieces per 50 min. hour at one piece per stroke of the machine at the Jacobs Mfg. Co., Hartford, Conn. It can do a similar job for you.

THE
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AUTOMATIC DIAL TYPE DRILLING, MILLING
TAPPING, AND SCREW-INSERTING MACHINES

FASTER..BETTER

The New S&E

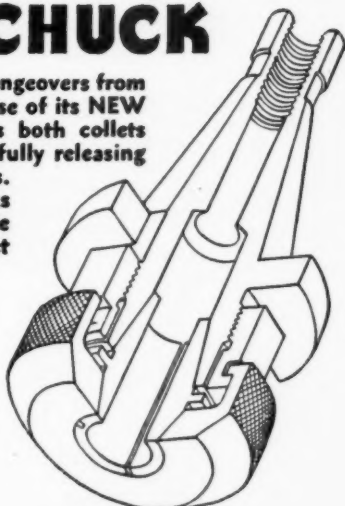
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COLLET CHUCK

FASTER!—Because it reduces tool changeovers from minutes to seconds. **BETTER!**—Because of its **NEW** self-releasing principle, that protects both collets and tools from damage through forcefully releasing them from taper, in tool changeovers. S & E "Rapid-Change" Collet Chucks are quickly and economically adaptable to all types of machinery using collet chucks.

Collets available in standard hole sizes. Special sizes quoted on request.

Prove to yourself how accurate a collet chuck can be. Write, phone—Flint 2-7912, or wire for a territory representative to call and explain the many advantages of this new-type S & E "Rapid - Change" Collet Chuck.



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TORIT Dust Collectors, installed at the machine, run only while the machine is operating. They require no extensive piping and are so efficient that the cleaned air is recirculated into the room. Machines and working conditions are protected. TORIT Dust Collectors are economical and, self-contained and portable, they fit all production layouts. Sizes range from $\frac{1}{3}$ HP to 3 HP, and there are models for every task. For complete information and latest TORIT Catalog write:

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MANUFACTURING CO.
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AIR POWERED **SCREW DRIVER IS THE ANSWER.**



MINIMUM SPOILAGE

EASE OF HANDLING

INCREASED PRODUCTION

The picture above shows an Ingersoll-Rand Size OOBLC air-powered screw driver applying four No. 8 screws that hold the leads to the brick on an automatic waffle iron. This insulating brick is very brittle and torque on the screw must be accurately controlled.

The I-R Screw Driver features a cushion clutch that minimizes rotary impacts and allows delicate torque adjustment. An integral part of the cushion clutch is an engaging clutch which permits the motor to run but rotates the bit only when the operator exerts a slight forward pressure on the

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Air tools are definitely superior for screw driving. I-R Screw Drivers offer you many advantages ...small size...light weight...more power per pound...accurate torque adjustment...dependability...run cool to the touch.

Air-powered screw drivers may be the answer to some of your problems. A reversible model is available in every instance where a reversible tool can be used to greater advantage. Call our nearest branch office for further details or a demonstration.

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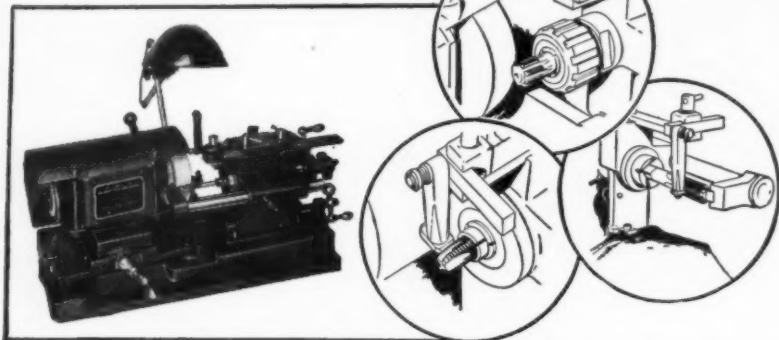
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CONDENSERS • CENTRIFUGAL PUMPS
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Model No. 1 for taps up to 6" long
Model No. 2 for taps up to 14" long



YOU SAVE 5 WAYS with the BLAKE TAP GRINDER

1. **TAP PURCHASES**—Blake-sharpened taps last five to ten times longer—thread many more thousands of holes per tap.
2. **FASTER SHARPENING**—A Blake sharpens taps by the turning of a crank—in one continuous *fast* operation—as easily as sharpening a pencil.
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These 5-way savings can save you, in one year, many times the cost of a Blake Tap Grinder. Before you turn the page, cut out the coupon below. It'll bring you the full details of the most profitable tap grinder ever made.

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BATH GROUND TAPS

**HARDENED, TEMPERED, TOUGHENED
THEN GROUND FROM THE SOLID**

Carefully selected, scientifically hardened steel; precision ground thread forms; superior surface finish plus excellent workmanship and years of "know how" make Bath Taps the finest available. To increase tap production and receive all over precision performance, call for and get the finest — Bath Taps.

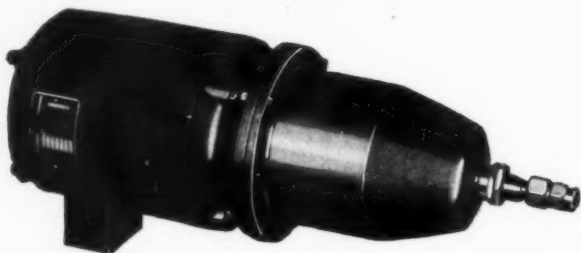


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NOW 2 Weeks' Delivery On Govro-Nelson MODEL "H" DRILLING UNITS

Thanks to increased receipts of motors, we can now make deliveries of Model "H" Automatic Drilling Units in 2 week's time. The Model "H" Unit, with 1725 RPM spindle speed, is suitable for drilling jobs with drills from .100" to 3/8", within the limitation of the spindle speed.

Customers using the Model "H" Unit during the past 10 years know it is very fast and extremely rugged. The units can be set up in multiples at any angle or in any plane to drill several holes at the cost of one.

Other models for smaller drill sizes, with spindle speeds up to 9000 RPM, are also available. Forward samples and blueprints of parts to be drilled and we shall be pleased to recommend the proper unit.

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GOVRO-NELSON Co.

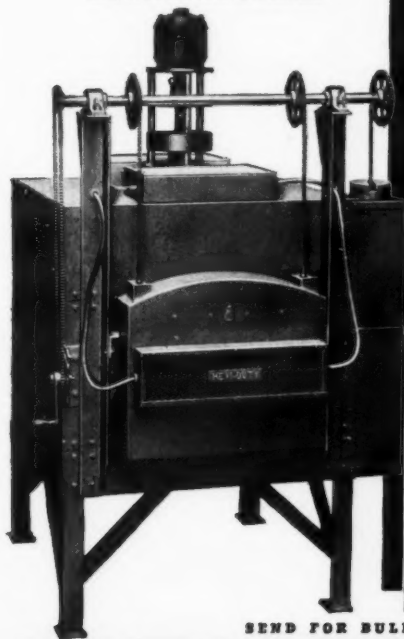
**1933 Antoinette
Detroit 8, Mich.**

Automatic **DRILLING UNIT**

The Chief Advantages OF THE **HEVI DUTY** *Multi Range* **CONVECTION FURNACES** *Box Type*

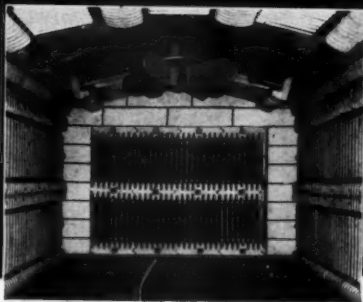
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Type H D - 243618 - A - 40 K W
Rating. A Multi Range Convection
Furnace used for heat treatment
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 - ✓ HIGH DEGREE OF UNIFORMITY
 - ✓ USE WITH OR WITHOUT FAN AGITATION
 - ✓ WITH OR WITHOUT PROTECTIVE ATMOSPHERE
 - ✓ PLAIN OR ROLLER RAIL HEARTH

Below: Interior view of
a Multi Range
Convection Furnace.



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bring you many advantages

★ Helical relief maintains constant clearance angles entire life of tool.

★ Finish lapped cutting surfaces produce better bores with faster feeds.

★ Resharpening confined to one face.

★ Down time for regrinding reduced.

★ Unskilled help can use tools without loss of efficiency.

STYLE C
for internal
threading

STYLE B
for boring
blind holes,
bottoming,
and facing

STYLE A
for boring
"through"
holes

Send for catalog that shows all sizes and prices. Ask for No. H-1139 for super high speed tools and for No. H-398 for carbide tipped tools.



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ONE SOURCE SAVES YOU TIME AND EFFORT
DoALL Products
Include:

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- **RADIUS SHAPER-MILLER:** 1 setup for many operations — has a thousand production uses.
- **VARIABLE SPEED DRIVES:** Smooth speed-changing drives. Infinitely variable.
- **GAGE BLOCKS AND INSPECTION INSTRUMENTS:** The finest for precision work.
- **TOOL-AND-DIE STEEL:** Non-warping, precision-ground up to 1 inch thick and 6 inches wide.

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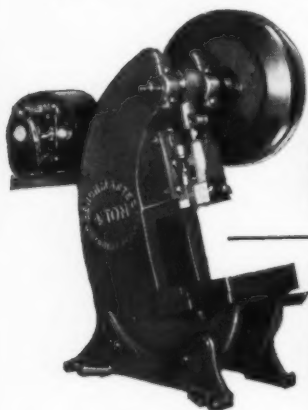
TOOLMAKERS'
LATHE

PRECISION
SURFACE GRINDER

Send for free pictorial booklet "DoALL EQUALS TEN PLUS" which compares fast, efficient Contour Machining with other metal-cutting processes. Shows how this miracle method at low-cost production makes great economies.

Benchmaster's^{*} Improved Model

4-TON CAPACITY BENCH PUNCH PRESS



^{*} World's largest manufacturer of small presses.

Small in Size

MIGHTY in Performance

FOR STAMPING, MARKING, PUNCHING, RIVETING, FORMING AND OTHER HIGH-SPEED OPERATIONS

Light, compact and powerful, the improved, postwar Benchmaster 4-Ton Capacity Punch Press offers performance formerly found only in far larger models. Its unusual and exclusive features include a cradle base that allows the press to be inclined, a precision-ground shaft keyed by a press fit to a large eccentric to provide shock-absorbing bearing surface, bronze bushings at all wear points, a single trip action that may be made to repeat rapidly by removing a screw located in the collar, automatic knockout, an open back so that work may also be inserted from the front, a new-type floating motor mount which maintains proper tension of the V-belt, standardization of parts for quick, easy interchangeability and many other typical Benchmaster improvements.

For full information about this new Benchmaster Punch Press and other quality Benchmaster machine tools, write to Dept. MT-6

SPECIFICATIONS:

Weight, 215 lbs.
Height, 27"
Die space, 5 $\frac{3}{4}$ "
Center of bolster plate to frame, 3 $\frac{3}{8}$ "
Bolster plate, 6" x 8" x 1" with 2" hole in center
285 strokes per minute with 1725 R.P.M. electric motor
1" stroke standard
Other strokes up to 2" special

benchmaster

MANUFACTURING COMPANY
2952 WEST PICO BOULEVARD
LOS ANGELES 6, CALIFORNIA



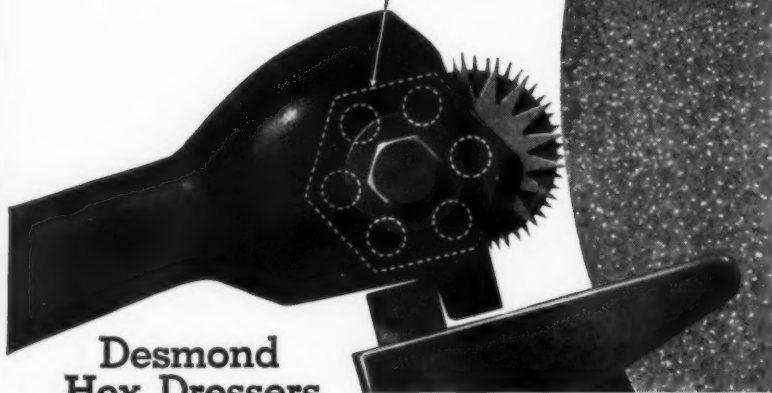


NEW Mohawk "lifetime" counterbore with blades that can be sharpened without waste for its entire length and integral, sub-land, precision, radial-ground pilot extending the entire length of the flute. Just sharpen the end of the blades-the pre-ground sub-land grows a new pilot for you. You never have to cut off useful tool life to re-establish a pilot. Write for sizes and prices on stock numbers to Mohawk Tool Company, 21647 Dequindre Road, Hazel Park, Michigan.

Mohawk
SUB LANDS

6 SETS
OF BEARINGS

6 TIMES THE SERVICE



Desmond Hex Dressers

Six-hole bearing blocks multiply service life

The Desmond Hex Dresser, with the six-hole hardened steel bearing blocks in the head, is the most durable mechanical dresser made. As one pair of holes wears, merely turn the block to a new set. No wear on the handle. When all six sets have been used, it's a simple matter to loosen the side screws, remove the cutter

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Desmond makes the only *complete* line of grinding wheel dressers on the market. To you, this means the right tool for every job . . . and, in turn, better performance and longer life from your grinding wheels. Write for the catalog of our complete line and the name of your nearest Desmond distributor.

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Desmond

the only complete line of grinding wheel
DRESSERS & CUTTERS



**BALL BEARING
DRESSERS**



**REVOLVING
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**DIAMOND HAND TOOLS
AND NIBS**



**WHEEL TYPE
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**SIMPLEX
STEEL-SLIDE VISES**



The principle of the Acro Die Set Puller is to remove the punch holder from die shoe by a straight upward pull, whereby punch holder travels upward from die shoe axially, leaving base leader pins simultaneously. This can be accomplished only by use of the indexed screw wrenches which act as indicators, controlling the upward travel. This is an exclusive patented by Acro feature, found only on Acro Die Set Pullers.



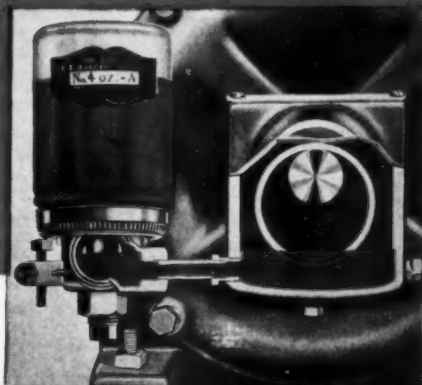
Order a set today. Convince yourself of the savings you can make in your tool room. ACRO PULLERS furnished in three sizes. Write now for more information.

Best visibility — Sight glass on side of lubricator bowl on exclusive SUPER feature, shows exact oil level maintained in bearing plus oil supply in reserve, eliminating guess work.

There is no drippage, no waste, no over flow. Oil is automatically fed to the bearings as required.

Nationally known authorities estimate that 75 per cent of all machinery repairs are caused by inefficient and improper lubrication, and that 85 per cent of the oil bought for lubricating purposes is never used by the bearing surface for which it was intended. WRITE FOR LITERATURE.

SUPER LUBRICATOR . . .

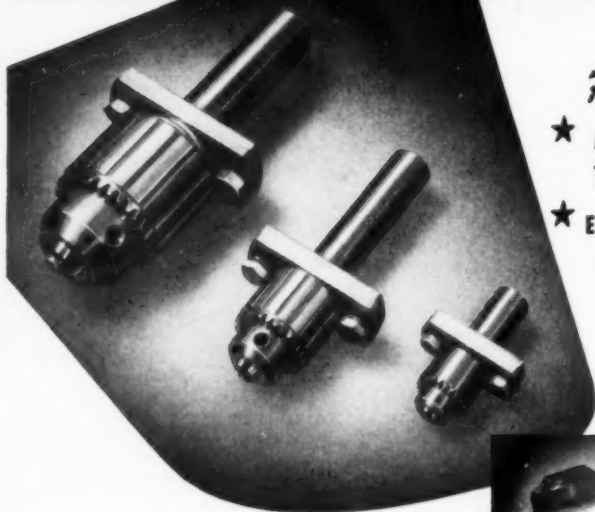


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METAL STAMPING COMPANY: 332 E. RESERVOIR AVENUE
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Barnaby CHUCK-TYPE FLOATING HOLDERS

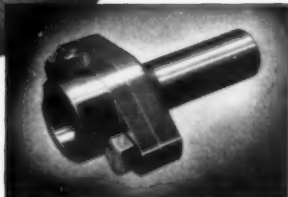


Provide

- ★ MUCH FASTER TOOL CHANGE
- ★ EASY, PERFECT ALIGNMENT

BARNABY CHUCK-TYPE Floating Holders offer new convenience in setting up automatics and turret lathes, and are particularly valuable on short-run work in cutting tool-change time to a minimum.

These sturdy high-precision tools consist of two parts: (1) the shank, with integral flange; and (2) a similar flange on which the 3-jawed chuck is mounted. Floating construction permits perfect alignment of tools with the work. Available in 7 capacities, with $\frac{3}{8}$ ", $\frac{1}{2}$ " and 1" shank diameters.



CONVENTIONAL FLOATING HOLDERS

These all-steel precision Floating Holders of conventional design are recommended for use where the quick-change feature of the Chuck-Type Holders is not required. Furnished in shank diameters of $\frac{3}{8}$ ", $\frac{1}{2}$ ", 1" and 1 $\frac{1}{4}$ ". One Barnaby Hinged-Shoe Bushing Blank is furnished with each Holder.

BETTER

Barnaby

1
TOOLS

Illustrated bulletin gives full details on these and other proven tools. May we send you a copy?

BARNABY MANUFACTURING and TOOL COMPANY

70 KNOWLTON STREET - - - BRIDGEPORT 8, CONNECTICUT

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1 OPENINGS: Clean, smooth, accurate to size, positive fit on bolts, nuts and cap screws.

2 HEADS: Face hand ground and polished. Sides hand ground to contour of design.

3 HANDLES: Edges rounded, smooth for comfortable grip.

4 FINISH: A copper base over the Billings Vitalloy Steel, next, a nickel plate over the copper base; finally, a heavy chrome plate over the nickel. That's Billings finish—made to protect—made to last!

5 DESIGN: Designed to give the most in strength — perfect balance yet light weight — "Grab hold of one!"

6 BILLINGS Vitalloy STEEL: Special alloy steel of Billings specifications — selected and laboratory tested for its strength and fatigue resistance.

7 MARKINGS: Wrench numbers and sizes clearly marked — can be read at a glance.

8 DROP FORGED: For strength to break loose the toughest nuts.

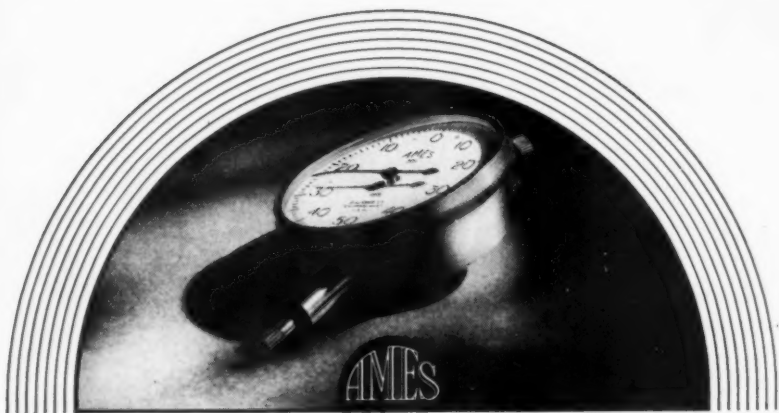
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THE ON-THE-JOB INDICATOR

Because every part and assembly is designed and built for *lasting protection* of initial sensitivity and accuracy, AMES Dial Indicators give more ON-THE-JOB time—require fewer adjustments—set a higher standard for speed and economy in checking procedure. For assistance in solving your measuring problems, a complete engineering service is available—without obligation.

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Forged Brass Case and Stem

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Pinions

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Hardened Steel Guidepin
and Guide Block

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GAGING TAPS by OPTICAL PROJECTION

—One of Many
Complex In-
spection Prob-
lems Solved
with E. S. D.
Charts and
Staging Fix-
tures.

The tap and its projected shadow are represented by T. The Accumulative Bar and its shadow (B) measure the accumulated error over the entire length of the tap within .0001". This same method can be applied to thread rolling dies and circular chasers.

CHART GAGE

STAGING
FIXTURE

THIS E.S.D. Chart and Staging Fixture represents the first practical direct means of checking a tap accurately and completely. They demonstrate how Optical Projection with scientifically coordinated Staging Fixtures and Chart Gages—those designed and custom built by E.S.D. permits—faster and more accurate inspection to minute dimensional limits. In many cases where contours are involved, this is the only satisfactory method.

Our experience embraces the design and production of Staging Fixtures and Chart Gages for optical inspection of products as diversified as pins and propellers—taps and turbines. In several instances we have accomplished what had been predicted impossible.

This experience is at your disposal. Whether or not you are now using optical projection, we invite you to write outlining any problem involving dimensional control.

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This is an exclusive feature, developed by MOTOR TOOL, that cuts MOTOR TOOL Live CENTER repairs to practically nothing—immeasurably INCREASES their life—and puts an end to burnouts, breakdowns and work spoilage.

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for NEW
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METAL CUTTING TOOLS

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to Call Motor Tool*

ROTO-CLONE cleans up a press room problem

THESE modern high speed offset printing presses turn out thousands of impressions per hour. To speed the drying of the finished work and prevent adhesion between sheets, each printed sheet is automatically given a shot of "offset spray" as it comes off the press.

This operation creates a certain amount of excess spray. If allowed to permeate the atmosphere, it creates an undesirable working condition, increases maintenance and results in costly soilage of finished work.

Installation of an AAF Type W Roto-Clone unit has eliminated all these difficulties. Excess spray is collected at point of application and conveyed to the Roto-Clone. The Roto-Clone separates the offset spray from the air and the collected material is automatically disposed of while the cleaned air is returned to the work room. Mounting of Roto-Clone on overhead balcony frees valuable floor space and removes air cleaning operation from working area.

Wherever there is dust—press room, machine shop, foundry, lime kiln—the Roto-Clone is successfully meeting the requirements of effective dust control. You will probably find the solution to your particular dust problem described in Bulletin No. 270-A. Write for it today.

AMERICAN AIR FILTER COMPANY, INC.

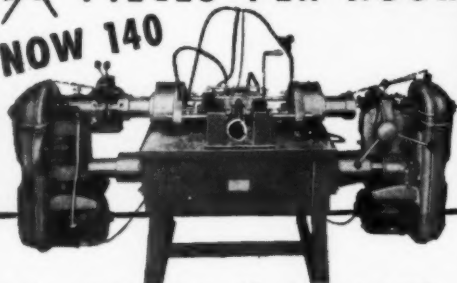
312 Central Ave., Louisville 8, Ky.

In Canada: Darling Bros., Ltd., Montreal, P. Q.



ROTO-CLONE
DUST CONTROL EQUIPMENT

~~25~~ **PIECES PER HOUR**
NOW 140

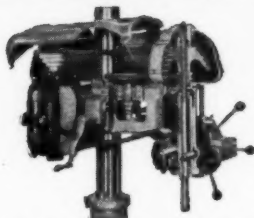


This set-up with Walker-Turner 20" automatic feed Drill Heads drills nine holes from two sides, in one automatic push-button cycle.

The Du-Fold Mop Manufacturing Company of Cleveland recently increased the production of metal mop heads by nearly 500% by using two Walker-Turner Drill Presses in a special set-up with Zagar gearless drill heads.

One head drills five and the other four holes—at opposite ends. The work locates automatically. A push button starts the complete cycle including retraction of heads.

20"
POWER FEED
WALKER-TURNER
Drill
Heads



20" Power Feed Drill Press Head.
Five standard spindle speeds,
400 to 2600 r.p.m. with 1740
r.p.m. motor. Capacity 1" in cast
iron, 3/4" steel.

*Price less motor \$216.00

"VERY DIFFICULT PROBLEM SOLVED," says DuFold

"It has really solved a very difficult drilling problem for us and we will be placing another order shortly," is the comment on this Walker-Turner job.

We used your 20" power feed drill presses in the manufacture of 40 mm. tracer shots during the war and we were so well satisfied with them that we did not consider any other make.

The wide range of speeds, and the 10 spline spindle with no play and low investment cost are other reasons why Walker-Turner drill presses were chosen for this set up.

TWENTY-FIFTH YEAR
1922 1947



*F.O.B. Plainfield—slightly higher west of the Rockies and in Canada
SOLD ONLY BY AUTHORIZED INDUSTRIAL MACHINERY DISTRIBUTORS
165

MACHINE TOOLS

DRILL PRESSES—HAND AND POWER FEED • RADIAL DRILLS • RADIAL SAWS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

PRESS PRODUCTION

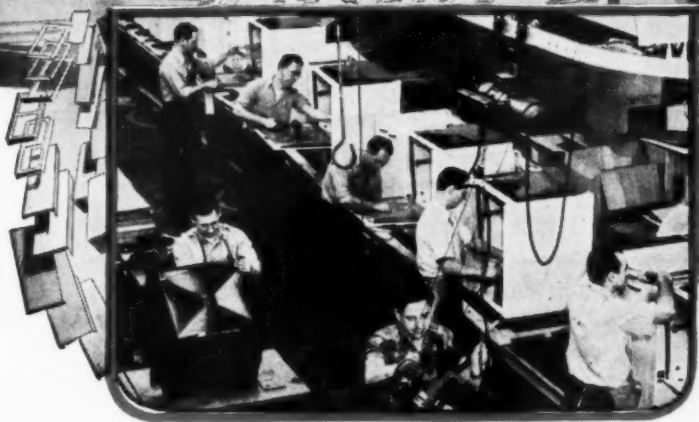


Photo Courtesy
Hotpoint, Inc.

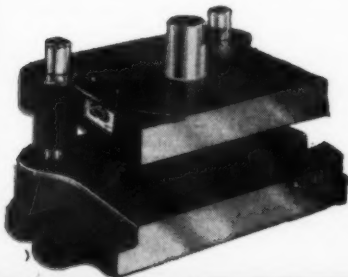
FEEDS THE ASSEMBLY LINE

The Assembly Line—symbol of American Mass Production—depends on a rapid and constant flow of finished parts to each stage of the assembly.

Largely responsible for keeping the line moving, Presses provide the fast, all-around production of duplicated metal parts that modern standards of production demand.

Danly Die Sets—a necessary part of good Presswork everywhere—speed die making programs, protect costly dies, cut down time for regrinds. Danly Die Sets and Die Makers' Supplies are nationally recognized for known dependable accuracy.

DANLY MACHINE SPECIALTIES, INC.
2100 South 32nd Avenue • Chicago 50, Illinois



DANLY

*National
Assembly*

Call Danly

- MILWAUKEE 2
111 East Wisconsin
- DETROIT 16
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- DAYTON 2
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16 Commercial Street
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- LONG ISLAND CITY 1
47-28 37th Street
- BUCCOMMUN METALS & SUPPLY CO.
4890 South Alameda, Los Angeles



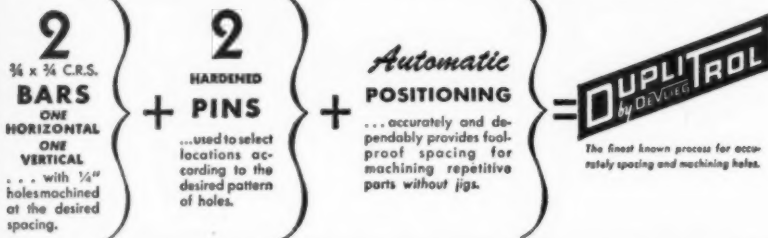
DIE MAKERS SUPPLIES

DANLY DIE SETS

Welded Steel Fabrication

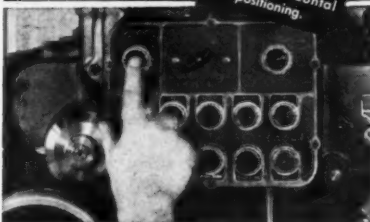
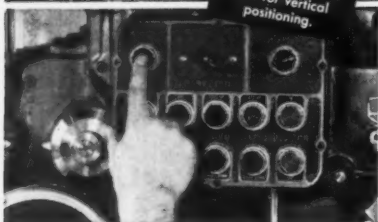
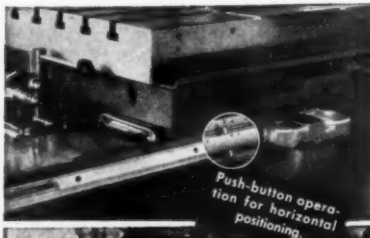
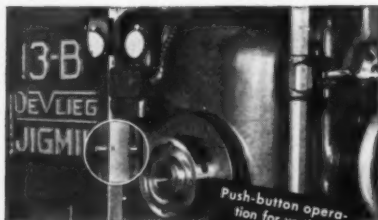
THIS IS DUPLITROL . . .

... FOR MAKING REPETITIVE PARTS WITHOUT JIGS!



THIS IS HOW IT WORKS . . .

Illustrated at right is one vertical bar and one horizontal bar with pins used as masters on the 3B DeVlieg Duplitrol Equipped Jigmil. Below are illustrations showing how all spacing is done in response to push-button operation.



DEVLIEG MACHINE COMPANY

DEVLIEG
JIGMIL

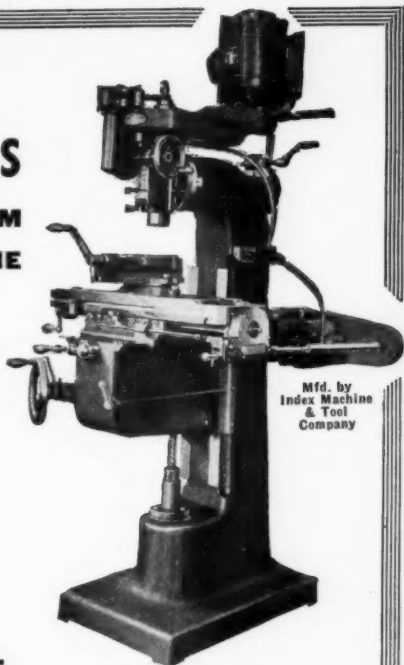
450 FAIR AVE. FERRISDALE 28, (Detroit) MICH.

INDEX VERTICAL MILLS

FOR THE TOOL ROOM OR PRODUCTION LINE

For use with end mills $\frac{1}{8}$ " to 1" in steel. Equipped with verniers, as standard equipment in addition to micrometer dials on table actuating screws for locating. Further accuracy available with rods and indicators which can be furnished as extra equipment.

If you want speed and precision on milling, drilling and boring send for a catalog on Index Mills.



Mfd. by
Index Machine
& Tool
Company

12" TOOL ROOM ROTARY TABLE



A quality tool for precision work in the tool room or production line, incorporating such features as ball bearings—hardened and ground worm—quick acting throw-out for free hand turning—single movement table lock that does not cramp table out of alignment—compound trough. 12" size only.

INDEX MILLS

Index Mills participated in all important war production programs from camera and guns to atomic bombs. Ask any owner how they like their Index Mill.

Write to Factory Sales and Distributing
Agents for complete information.

BLANK & BUXTON MACHINERY CO.

3100 E. MICHIGAN AVE.
JACKSON, MICHIGAN

Simplify

DRILLING JOB SET-UPS WITH

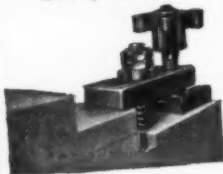
SIEWEK

STANDARD RAPID CLAMPING DRILL JIGS



RIGHT OR LEFT
HAND OPERATION

Manufacturers of
SIEWEK
*Fixture Clamps
and Fittings*



**SPRING OR RACK-AND-PINION TYPES—SQUARE
OR OVAL TOP PLATES—11 STANDARD SIZES**

One Siewek Jig—with simple adapters that you make in your own shop—can replace many special jigs. Save designing and tool room time . . . Eliminate excess "idle-time" for drill presses . . . Assure faster, easier set-ups and re-tooling operations.

Siewek Jigs are available in spring type for light work and rack-and-pinion type for heavier uses. Right or left hand operation. They are built to precision standards—sturdy and simple in construction.

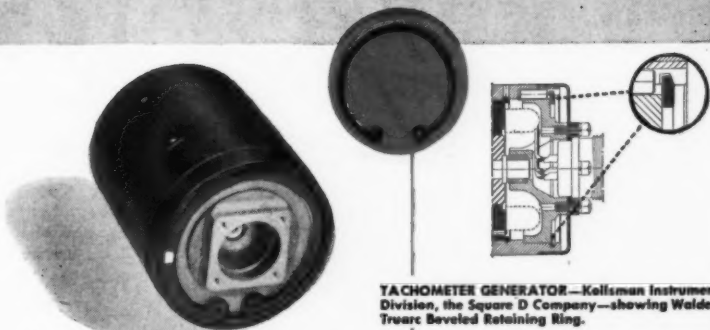
Write today for Siewek Jig Catalog 6-J.

SIEWEK TOOL COMPANY

2862 East Grand Boulevard, Detroit 2, Michigan

Distributors in Principal Cities

Truarc Beveled Ring takes up end-play, eliminates shims, saves 20 minutes' assembly time



TACHOMETER GENERATOR—Kollsman Instrument Division, the Square D Company—showing Waldes Truarc Beveled Retaining Ring.

When installed in a groove with a corresponding bevel, the tapered edge of the Beveled ring acts like a wedge and rigidly bridges end-play. End-play can also be taken up resiliently by another type Truarc ring—the Bowed.

Wherever you use machined shoulders, nuts, bolts, snap rings, cotter pins—there's a Truarc ring that does a better job of holding parts together. All Truarc rings are precision engineered, easy to assemble and dis-assemble, always circular to give a never-failing grip. They can be used over and over again.

See what can be done for your product: send a drawing to Waldes Truarc Technical Service Engineers for individual attention without obligation.

One Waldes Truarc Beveled Retaining Ring gives Five big advantages:

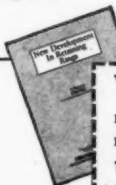
- Secures the cover with its connecting parts in the housing against strong pressure, heavy vibration
- Absorbs accumulated tolerances up to .010 (ring diameter is 1.9375)
- Eliminates shims, saves material and weight
- Saves 20 minutes' assembly time
- Simplifies field maintenance by facilitating quick dis-assembly, re-assembly



WALDES
TRUARC
Reg. U.S. Pat. Off.
RETAINING RINGS

WALDES ROBINMOOR, INC., LONG ISLAND CITY 1, NEW YORK
Canadian Division: Controlite Engineering & Sales Ltd., 30 Moor Street W., Toronto 5

WALDES TRUARC RETAINING RINGS ARE PROTECTED BY U.S. PATS. 2,902,948; 2,008,404; 2,416,902 AND OTHER PATS. PENDING.



*Mail this coupon today for your copy of
"New Development in Retaining Rings"

Waldes Robinmoor, Inc., 67-50 Astor Place 22P
Long Island City 1, N. Y.
Please send booklet, "New Development in Retaining Rings" to:

Name _____
Title _____
Company _____
Business Address _____
City _____ Zone _____ State _____

Here it is.

RUGGED, light and compact—featuring positive drive and accuracy—this new type Tap Chuck is ideal for use on all types of tapping heads and tapping machines. Lightness and compactness mean less torsional inertia on the spindle which contributes greatly towards reducing tap breakage—particularly in bottom tapping—and allows for quicker stopping and reversing of the tapping spindle. The heart of this chuck is the Jacobs Rubber-Flex Collet. Made as a single unit, the Rubber-Flex Collet is comprised of several hardened steel jaws per-

manently bonded into a synthetic rubber body. All working surfaces of this collet are precision ground after moulding and the collet is centralized by a ground conical bore in the chuck body, assuring extreme concentricity. Because the jaws of the Rubber-Flex Collet are rigid steel pieces ground to a fixed shape and all flexing is assumed by the resilient synthetic rubber web separating the jaws, parallelism of the jaw bites is assured throughout the entire range of the collet so that the smallest tap is held as firmly and as accurately as the largest.



Model 400 capacity from ± 0 to ± 10 machine screw taps.

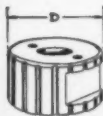
Model 420 capacity from ± 10 machine screws to $5/16"$ fractional.

Model 840 illustrated actual size, capacity $5/16"$ - $5/8"$ fractional taps.

BRAND NEW!

A STRONG, LIGHTWEIGHT TAP CHUCK MADE WITH THE JACOBS RUBBER-FLEX COLLET

CHECK THESE SPECIAL FEATURES!



SMALL DIAMETER

Combined with light weight keep to a minimum the torsional inertia a holder builds up on a tapping spindle.



GREATER GRIPPING POWER

The parallel bite of the Rubber-Flex Collet prevents disengagement of the positive drive.



GREATER ACCURACY

Completely ground collet and chuck body give unusual control of run-out.

POSITIVE DRIVE

Floating back jaws provide positive drive on all sizes of tap squares.



SIMPLIFIED TAP CHANGING

Quarter turn of cap and the jaw screw disengages tap from chuck. Large sight hole facilitates tap changing.



WIDE COLLET RANGE

One collet takes all taps in its range. No individual sleeves or changing required.



For prices and complete specifications of this new chuck ask your Industrial Supply Distributor for Jacobs catalogue 47-T.

Jacobs Chucks

THE JACOBS MANUFACTURING COMPANY
HARTFORD 3, CONNECTICUT

MORE OUTPUT IN LESS TIME!

with the new Self-Indexing

Enco HEXTURRET

— the better bed turret



Potent Pending

DOUBLE DRIVE
for equalized
power

DOUBLE GIBS
for constant
accuracy

Two Hexturret
sizes for 9" to
12" lathes:

Model 425 with
4½" stroke for
12" to 16"
lathes:

Model 650 with
6½" stroke

Here is a Tool truly dual-purpose and dual productive, ready to keep production costs down. It converts bench lathes for turret and screw machine work. Tailstock operations are speeded as much as 50% on most jobs — closer tolerances and greater precision. New vise grip clamping prevents crawling under heavy cuts. Balanced slide assures greater accuracy and reduces operator fatigue. Enco Hexturrets are a paying investment for both large and small shops. Write today for illustrated folder and prices.

ENCO MANUFACTURING COMPANY

4522-24 FULLERTON AVE., DEPT. 26, CHICAGO 39, ILLINOIS

EXPORT DIVISION: 205 W. Wacker Drive, Chicago



**QUIET
ZONE
AIR
FILTERING**

***Stops
Corrosive
Moisture***

***You
KNOW IT
because you
SEE IT***

THE *New* NORGREN TRANSPARENT BOWL FILTER

gives your air tools and cylinders effective protection against corrosive moisture and emulsions as well as abrasive solids.

- Directional air inlet (Tornado Jet) imparts swirling motion, separating and throwing moisture to outside wall.
- Moisture runs down below baffle plate.
- Baffle plate divides bowl into ACTIVE and QUIET zones—active, where moisture separation takes place, quiet, where moisture accumulates for draining off instead of being driven along due to exposure to air turbulence.
- Reinforced Monel wire screen stops all solids.
- Transparent bowl shows condition of filter at all times.

***Write for Detailed Information. C. A. NORGREN, 222 SANTA FE DR.
DENVER 9, COLORADO***

Norgren

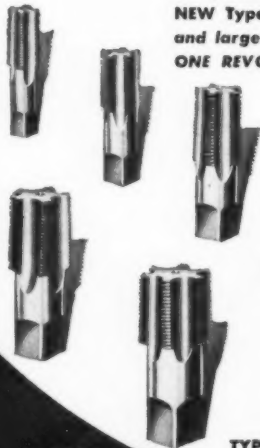


... A "REVOLUTION" IN MACHINING INDUSTRY...

**TOUGH Threading jobs licked by
COULTER TYPE "H"
THREAD TAP MILLING MACHINE**

NOW... comes a development that extends the capacity of this 'wonder' machine. COULTERS' are made to perform the most delicate threading operation with both speed and accuracy... 40 years of specialized experience, manufacturing precision machines exclusively. The NEW Type "H" is equipped with an overarm tail center and large collet chuck, holding the work rigidly so **ONLY ONE REVOLUTION OF THE TAP** is necessary.

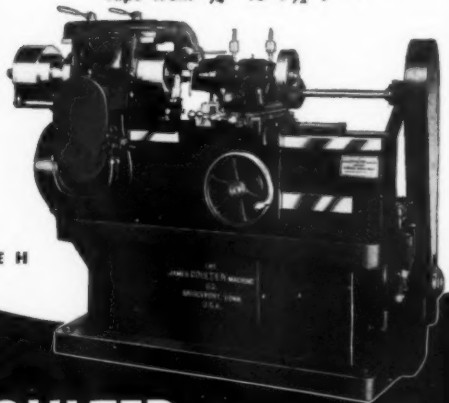
Any number of FLUTES, eccentric or con-eccentric relief straight or taper can be produced. Pipe taps from $\frac{1}{8}$ " to $1\frac{1}{2}$ " and straight taps from $\frac{1}{4}$ " to $1\frac{1}{2}$ ".



TYPE H

WRITE FOR
FULL PARTICULARS

PRODUCTION MACHINES
SINCE 1896



The James **COULTER** *Machine Co.*
BRIDGEPORT • CONNECTICUT • U. S. A.

PEP UP PRODUCTION WITH

S.S. White

SUPER-QUALITY SMALL TOOLS

A FEW OF THE MANY TYPES AVAILABLE



**S. S. WHITE
STEEL BURS**
Accurately cut, cor-
rectly sharpened and
hardened.



**S. S. WHITE
ABRASIVE POINTS,
WHEELS - DISKS**
Wide variety of sizes
and shapes for hard
and soft materials.



**S. S. WHITE
INDUSTRIAL
HANDPIECES**
For light and heavy
industrial service.

S. S. WHITE FLEXARMS



CONSISTING OF:

1. Ball-Bearing Motor Coupling for quick set-screw attachment to motor shaft.
2. Flexible Shaft with either Metallic or Fabric-Covered casing.
3. Handpiece especially engineered for industrial duty.

These FLEXARMS come in a variety of shaft sizes with handpieces for light or heavy duty. Attached to a spare motor they make a handy, time-saving shop tool for grinding, drilling, polishing and many other operations.

WRITE FOR CATALOG TD

It illustrates and describes the complete line of S.S. White small cutting and grinding tools and FLEXARMS.

S.S. WHITE INDUSTRIAL

THE S. S. WHITE DENTAL MFG. CO.

DIVISION

DEPT. H 10 EAST 40TH ST., NEW YORK 16, N. Y.



FLEXIBLE SHAFTS • FLEXIBLE SHAFT TOOLS • AIRCRAFT ACCESSORIES
SMALL CUTTING AND GRINDING TOOLS • SPECIAL FORMULA RUBBERS
MOLDED RESISTORS • PLASTIC SPECIALTIES • CONTRACT PLASTICS MOLDING

One of America's AAAA Industrial Enterprises

Look to **MODERN** for accurate,
fast, economical thread cutting

Hardened and ground throughout

Wider threading range

*Made with least
number of parts*

*Cut close-to-shoulder threads
without special chasers*

Easily adjusted for thread size

Greater flexibility

Quick and easy chaser change



MODERN

STATIONARY TYPE SELF-OPENING

DIE HEADS

Modern Precision Tools
Include

STATIONARY SELF-OPENING
DIE HEADS

ROTARY SELF-OPENING
DIE HEADS

STATIONARY
COLLAPSIBLE TAPS

ROTARY
COLLAPSIBLE TAPS

MODERN-MAGIC
CHUCKS AND COLLETS

SELF-OPENING
STUD SETTERS

INSERTED BLADE
FACE MILLING CUTTERS

SOLID ADJUSTABLE
DIE HEADS

ADJUSTABLE HOLLOW
MILLING TOOLS

UNIVERSAL CHASER
GRINDING FIXTURES

Modern Self-Opening Die Heads thread diameters from $\frac{1}{8}$ " to 7" in standard heads, and up to 14" in special heads . . . accurately, fast, and economically. They are adapted to practically every thread cutting operation within their capacity. Designed for use in hand screw machines, turret lathes, and other machines where the die heads are used in a stationary position.

For complete information,
write for Bulletin No. M-123

MODERN TOOL WORKS

DIVISION OF

CONSOLIDATED MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

THE CONE AUTOMATIC MACHINE COMPANY



see many

GOOD THINGS AHEAD

It is reported that

The Boston and Maine Railroad is washing cars automatically at the rate of one a minute between revolving brushes with a water spray

get ready with CONE for tomorrow

The sound-on-wire principle has been applied to a unit made by Sound Media to be used with billboards or displays.

be ready with CONE for today

Permanete Metals Corp. is experimenting with a magnesium blasting powder that is said to be insensitive to shock and not ignited by sparks.

get ready with CONE for tomorrow

The new Bendix-Stromberg carburetor compensates for changes in atmospheric pressure as in mountain driving.

be ready with CONE for today

Bendix Radio Division's new Type PAR-3 receiver weighs only one and a half pounds and is particularly suitable for small aircraft.

get ready with CONE for tomorrow

New York City's Third Avenue Transit Corporation is shifting from rail cars to buses and will use 700 General Motors 44-passenger diesel buses.

be ready with CONE for today

An electronic "stop watch" developed at Yale University is said to measure the speeds of particles accurately to a thousand millionth of a second.

get ready with CONE for tomorrow

Hudson Products Co. of Detroit makes a grinder with a 3-inch silicon-carbide grinding wheel driven by a water motor that can be attached to any faucet.

For crippled veterans, International Business Machines Corp. has devised an electrically operated artificial arm.

get ready with CONE for tomorrow

North American Phillip Co. is developing an arc welding technique that can be used by unskilled workers.

be ready with CONE for today

Aerojet Engineering Corp. predicts the use of its rocket power for the stopping and starting of heavy machinery.

get ready with CONE for tomorrow

The Bureau of Standards has a new gel capable of detecting one part in 500 million of CO.

The Whiting Corp. of Harvey, Illinois, has an electric hoist that will lift a ton but weighs only 87 pounds.

be ready with CONE for today

American Gas Accumulator Co. is making an inexpensive, breakable runway light for airports that shatters, if struck, without damaging the plane.

get ready with CONE for tomorrow

Dow Chemical Co. has used a solution of calcium chloride to freeze-proof carloads of coal in transit.

be ready with CONE for today

Diamond Instrument Co. is making a portable seismograph, particularly for highway surveys and constructions.

get ready with CONE for tomorrow

New Hampshire Ball Bearings Inc. is the first in this country to put the new ultra-small precision ball bearings into mass production

FOR THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION

Give ordinary jobs

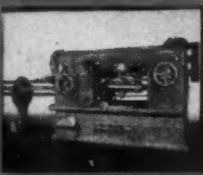
to any automatic.

Put the special

ones on a CONE.



From 1 1/2" dia. SAE 1112, a 6-Spline Conomatic, with 11 teeth, produces the piece shown in 86 seconds.



Ask your CONE representative to show you our new color motion picture

CONE

AUTOMATIC MACHINE CO., INC. • WINNEBAGO, WISCONSIN U.S.A.

With **SUNNEN PRECISION HONING**
You Can Produce Holes with

Accuracy to .0001" at Low Cost

Used on thousands of parts, the Sunnen Precision Honing Machine finishes parts quickly and more accurately. Parts last longer and there are fewer rejects—even when tolerances are as close as 1 to 2 ten thousandths.

Produces holes straight and true; corrects errors of taper and out-of-roundness; align-hones two or more holes of the same size; accurately duplicates sizes.

To hold very close tolerances on those "difficult" jobs—or produce better than usual finishes—the Sunnen Precision Honing Machine does the job rapidly and economically.

Write for Bulletin XMAN 5000, or ask a Sunnen engineer to call and show you how Sunnen Honing can be used in your plant.



- Size range—.120" to 2.625" in diameter
- Low in cost—economical to operate.
- Does not require skilled labor.



SUNNEN PRODUCTS COMPANY

7935 Manchester Ave. • St. Louis 17, Missouri

Canadian Factory: Chatham, Ontario



The Sunnen Precision Honing Machine is used on parts like these . . .



Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.



Compressor Yoke. Alignment maintained and better finish produced.



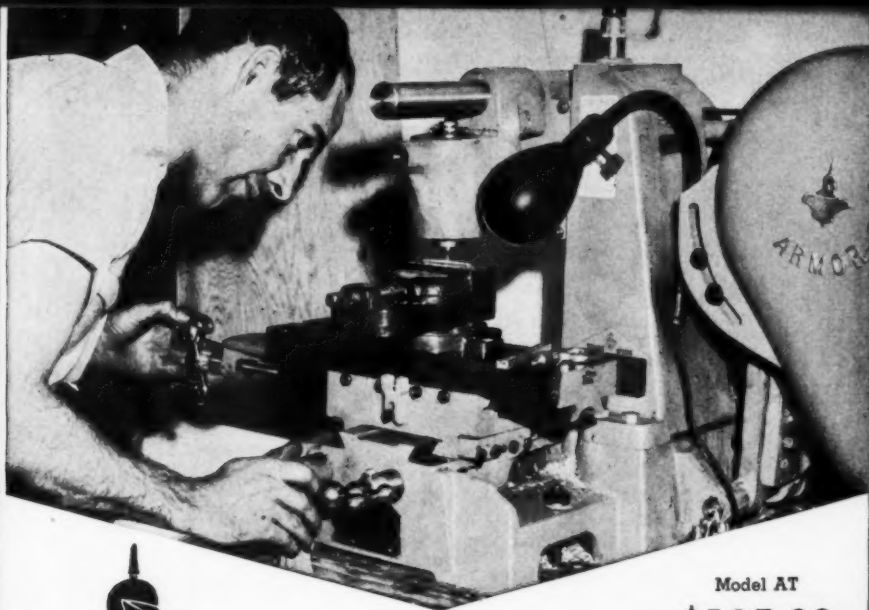
Hydraulic Two-Way Control Valve. Hole is honed to eliminate leakage.



Drawing and Blanking Die. "Saves time in producing smooth base metal finish."



Mild Steel Clevis. Honing corrected errors of previous operations and maintained true alignment of two holes.



Weigh 700 pounds
with floor stand.

Can use 1 h.p. motor.

GERALD TITUS,* says:

"The ARMOR Milling Machine far surpasses any mill I have ever used. I feel that it's the top piece of precision equipment necessary to complete first quality camera machine work."

*One of Hollywood's foremost camera craftsmen. Armor Mill purchased through: Production Machinery Sales of Los Angeles.

Model AT

\$195.00

Accessories Extra

TRAVEL:

12" Long
10" Vertical
7" Cross

ARMOR IS THE ONLY MILL WITH:

1. Bed-type base eliminating knees with alignment weakness. (under \$2365.00)
2. Lead screws ground from solid. (under \$3680.00)
3. All ways hand scraped. (under \$1865.00)
4. Hand, Lever, or Reversible Power Feed in one machine. (exclusive feature)
5. Tool Post Holder and threaded spindle for doing lathe work. (exclusive feature)

Write for Bulletin BB-5.

AIRCRAFT MACHINERY CORPORATION
BURBANK, CALIFORNIA

The NEW SIMPLEX COLLAPSIBLE TAP



*For Greater Speed
Efficiency • Economy*

Size	STRAIGHT THREAD SIZES	STRAIGHT or TAPER IRON PIPE SIZES	TAP PRICE	STANDARD CHASER PRICE
T 30	11/16" - 1/8" DIA.	1/2"	\$ 95.00	\$20.00
T 40	1/2" - 1-3/32" DIA.	3/4"	100.00	23.00
T 50	1-3/32"-1-5/16" DIA.	1"	105.00	25.00

A NEW tool that slashes 50% off production tapping time.

• Reversing is eliminated. Chasers collapse AUTOMATICALLY for withdrawal when desired depth is reached.

• Taps blind holes as readily as open holes. Taps practically any metal, alloy, plastic, or hard rubber with equal ease.

K-W PRODUCTS, INC. 3167 N. 30th St., Milwaukee, Wis.
Kilbourn 4160

COLD CEMENTS PROVIDE SIX "PLUS-VALUES" IN SETTING UP MANY POLISHING WHEELS

For bonding abrasive grain to the face of polishing wheels and polishing belts, "cold" cements have come to replace glue in a wide variety of applications. Such cements are commonly known as "cold" since they are applied cold, instead of hot.

Originally, greater success was scored with coarse and medium abrasives, ranging from the coarsest grade down to about 150 grain. Thanks to more recent improvements, equally effective results with finer sizes are now obtainable.

Of several benefits which accrue from the use of quality-type cold cements for setting up polishing wheels and belts, the following six comprise the more important ones, according to one leading finishing materials supplier.

1.—Procedure for wheel or belt preparation is simpler and easier.

2.—Effective polishing "life" of wheels or belts is considerably longer on most jobs, with more pieces polished per wheel and per hour. That is because such wheels not only cut faster during the period of actual use, but also such wheels need less frequent changing so as to reduce nonproductive shutdown time.

3.—Drying time is shortened, enabling

wheels or belts to be returned to production-line service more quickly, thereby cutting necessary inventory of such wheels down to minimum level. Often this is a factor of great importance, particularly in shops and plants crowded for room, as it reduces space occupied, the investment, and many other problems incident to economical purchasing and proper storage.

4.—While overheating of glue in preparation, curing, or polishing operations has a destructive effect, the same temperatures and conditions have little, if any, injurious effect on a first-class cold abrasive cement. Such a cement does not become brittle nor lose its adhesive properties, but still bonds the grain to the wheel or belt. Heat hardens a good-grade cement; heat softens glue.

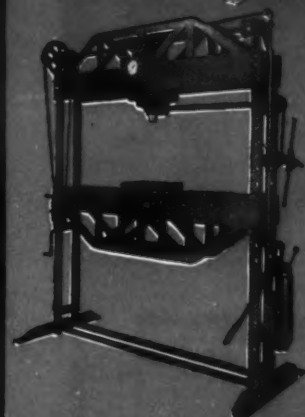
5.—Per-pound-price of such a material usually runs far below the cost per pound of the high-grade hide glue recommended for such purposes.

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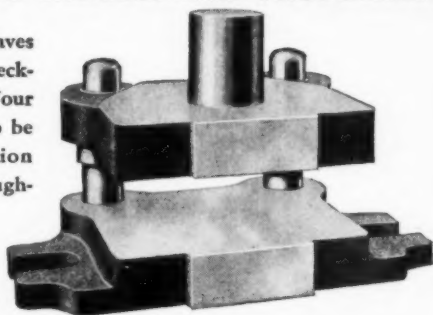
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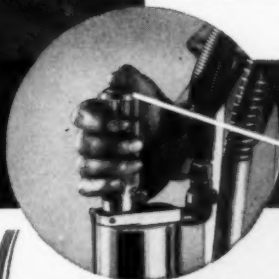


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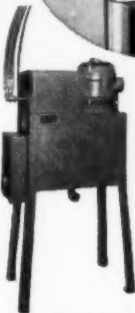
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Changing Flywheels to Welded Steel

BY L. C. BEATTY, PRES.

BEATTY MACHINE & MANUFACTURING CO., HAMMOND, IND.

In machining flywheel castings for our punches and shears, we occasionally ran into blow holes which necessitated scrapping of the flywheel and resulted in a loss of the machining man-hours. These unfortunate experiences led us to develop a line of welded flywheels built from homogeneous steel plate.

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Not only have we eliminated former scrap losses, but we have cut the cost of our flywheels about 20% with the welded construction.

One of the cast iron flywheels is shown in Fig. 1. A welded flywheel is shown in Fig. 2.

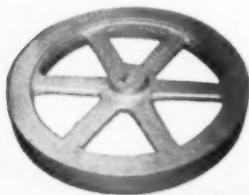


Fig. 1. Flywheel of cast iron construction used formerly.

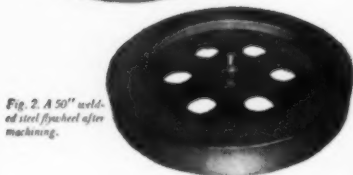


Fig. 2. A 50" welded steel flywheel after machining.

HOW IT IS BUILT

The 50" flywheel shown in Fig. 2 is built as shown in the sketch of Fig. 3. Interior fillet welds are made with the wheel in the flat position with one pass of $\frac{1}{4}$ " Lincoln "Fleetweld 11" Electrode. The deep-groove welds that join the outer plates to the web are made downhand with the wheel in a motor-driven fixture as shown in Fig. 4. The grooves are filled with $\frac{1}{4}$ " "Fleetweld 11".

We expect soon to install a "Lincolnweld" automatic outfit to make all of these welds. This equip-

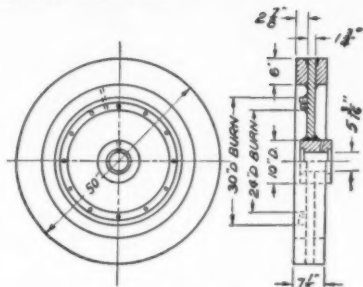


Fig. 3. Construction of welded steel.



Fig. 4. Welding flywheel in fixture.

ment should reduce the cost of our flywheels even further.

Flywheels comprise just one of many parts for our shears and presses which we have changed over to welded steel design. In this development work we have found it helpful to have the Machine Design Studies published by Lincoln Electric. These may be obtained by writing The Lincoln Electric Company, Dept. 314 Cleveland 1, Ohio.

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Featured in ... this issue ...

REPORT ON PLASTICS MATERIALS, by Frank Charity, discusses the various kinds of plastics materials on the market, their various uses and their composition. Comprehensive tables list the physical properties of the plastics mentioned in the article. Page.....137

...

STAMPING BODY PANELS AT KAISER-FRAZER. A battery of presses ranging in capacity from 350-ton single action units to gigantic 1,500-ton triple-action presses are described in this article. From three to nine stamping operations are required to turn out each different body panel. The operational procedure and various operations are discussed. Page159

...

OPERATION OF AN ENGINE LATHE, by The Shell Oil Company. In this issue various ways of accurately mounting workpieces of different shapes and sizes, to permit different cutting operations, are explained. This installment presents the first part of this subject, the second installment will be presented in the July issue of the **MACHINE AND TOOL BLUE BOOK**. Page173

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LETTER FROM ENGLAND. Page.....199

...

USING CARBIDES IN METALWORKING, by H. A. Frommelt. Mr. Frommelt continues his excellent series on the use of carbides with low horsepower milling machines. These articles are written in a down to earth, practical fashion by this well-known industrial consulting engineer. Page.....211

WELDING AND FIRE PREVENTION OF MAGNESIUM, concludes the discussion of magnesium which was begun in the March issue. In this month's presentation the various methods of welding this light and strong metal are analyzed. Also included in this article is a presentation of methods of preventing magnesium fires. Much of this material supersedes previously published material on the subject of fire prevention. Page...233

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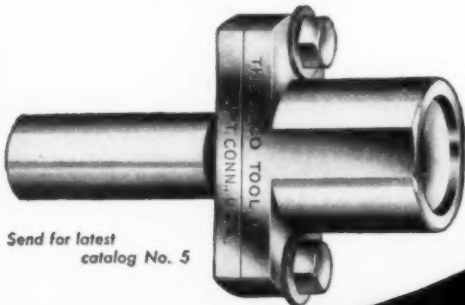
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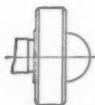
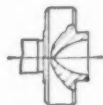
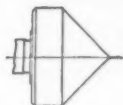
The same tool is used as a REVOLVING SUPPORT by means of inserts made to fit the contour of the work end. In this way, absolutely rigid support is applied for long pieces or for accurate forming, making increased feeds possible. With the Alco Revolving Support, you can produce many jobs on the automatics which formerly were thought could only be run on hand screw machines or by slower operations.

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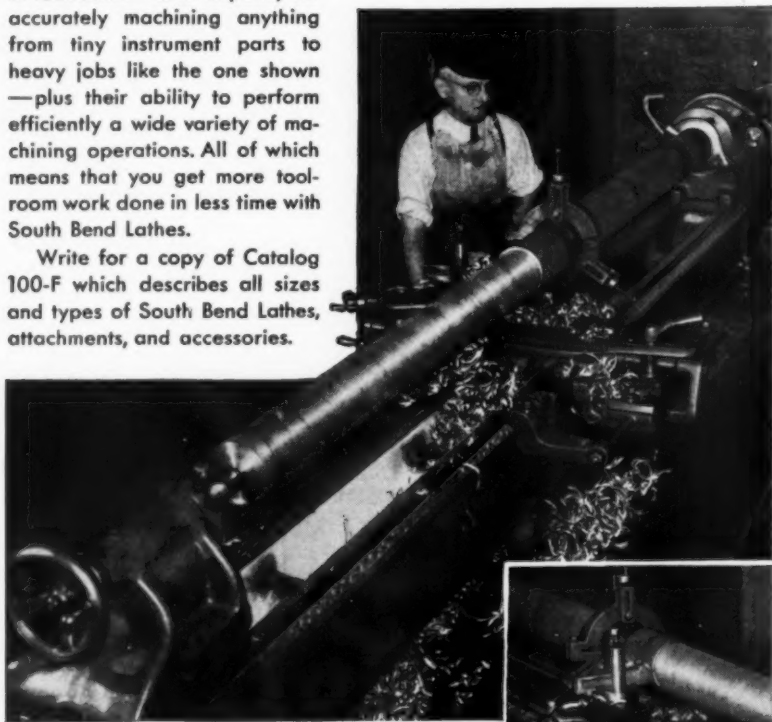
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As the Editor SEES IT

33% OF OUR PEOPLE WOULD DO AWAY WITH PRIVATE ENTERPRISE

A national survey, recently conducted by the Psychological Corporation netted the startling information that 24% of our people believe they would be happier and wealthier if business were operated by the Government. Another 9% believed they would be as well off as they are now under government ownership.

Naturally a percentage of this 33% are professional knockers for whom even the universe, under divine leadership is badly organized; another small percentage are probably the "have nots," for whom a social program, to better their lot, is urgently needed, and has been for hundreds of years. But our concern is not with the professional knockers, the "have nots," or the "lunatic fringe," but with the millions of Americans, who should know better, yet who believe the capitalistic system is doing them dirt.

The reason for their cynical attitude against our economic system is not difficult to ferret out. It is primarily based on misinformation and non-information. Much of the misinformation is engendered by selfish labor leaders not consciously in all instances, but the very reason for their existence "to better wages and working conditions of the workers" necessitates, as a part of their strategy to achieve their ends, a campaign to prove that business can afford to pay. . . that it is making \$3 for labor's \$1, that business is out to exploit the

workingman to the limit. Add to this the unsavory business history of some corporations and the short-sighted labor and dollar-hungry business policies of some employers, it is inevitable that the percentage of the public, thrown under the influence of these forces, be extremely blase about our economic system.

An indirect reason for the increased babble for government control is the habit of business to hide its light under a bushel. Business must clarify economic issues and point out the benefits of our present system; it must become militant in its efforts to recount the advantages of capitalism. Certainly, neither our schools nor our government is doing a job of selling our system to the American public.

To be sure, a co-operative group comprised of the majority of business enterprises is active in promoting the interests of business; as such its value is probably extensive. Its success in educating the average American on capitalism is seriously questioned in the light of the 33% who would bury capitalism.

The educational job must be undertaken by each individual business in its home city, among its employes, friends, stockholders, customers and the public.

If 33% of our people favor Government ownership now, during lush times, what percentage will clamor and fight for governmental ownership tomorrow?

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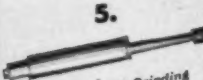
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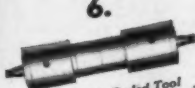
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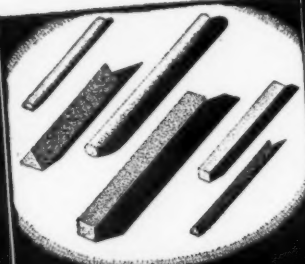
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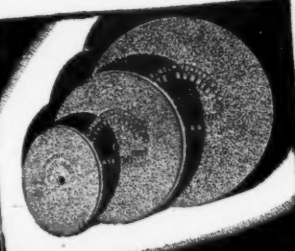
This group studies, appraises and charts abrasive applications. New improved methods and better abrasive products are often turned up. CARBORUNDUM engineers are also called in to help in selecting the best abrasives to use for specific jobs and in specifying their application. The end result is better grinding, sanding and finishing at lower overall cost... another reason pointed to in preferring abrasives by CARBORUNDUM. The Carborundum Company, Niagara Falls, New York.



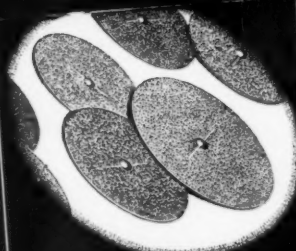
A Good Rule for Good Grinding



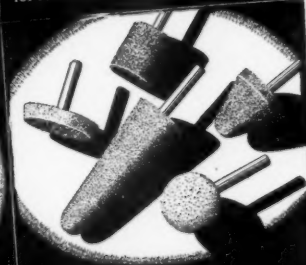
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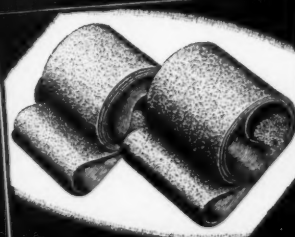
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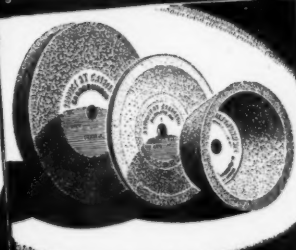
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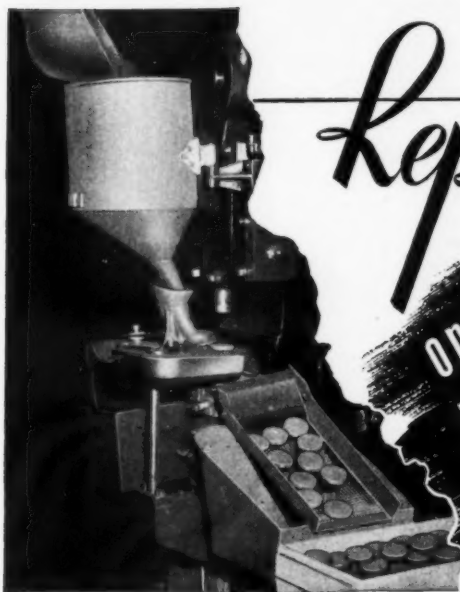
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RYERSON STEEL



Report

on plastic materials

by FRANK CHARITY

The author describes the physical characteristics of plastics, methods of using them, types of commercial plastics. Specific physical properties of the more commonly used plastics are listed.

There is no really good definition of plastics at present, but they may be generally described as resin-base materials. They are frequently referred to as "synthetics" because a certain quota of syntheses are invariably required to make them into finished products, but their components are more or less directly derived from natural (animal, vegetable, or mineral) sources. For instance, shellac is essentially a fluid extracted from the lac insect—a tree parasite which thrives in southern Asia.

Each plastic may be classified as a

"thermoplastic" or "thermosetting" material. A thermoplastic material tends to melt each time when heated and solidifies when cooled. A thermosetting plastic, tends to become permanently hard or cured after heating by the same general process that causes natural rubber to vulcanize. Most plastics in either group will melt or cure at temperatures of 300°F. or less, disintegrating when subjected to progressively higher temperatures. However, a few recently-developed plastics have successfully withstood temperatures of more than 600°F.

All plastics are made by taking natural elements or compounds and combining them so that they will "polymerize" or create new molecular structures without actually losing their respective identities, and each is subject to many variations in physical properties with the addition of miscellaneous ingredients—which are known as "plasticizers," "fillers," "pigments," and "catalysts." Plasticizers ordinarily increase the fluidity of liquid plastics or the flexibility of cured plastics. Pigments produce various color effects. Boric acid, wood flour, glass fibers, and other ingredients, which alter the physical or chemical properties of a hardened plastic, are collectively known as fillers. A catalyst is a compound whose primary function is to help other ingredients combine or solidify—often without taking part in the reaction. When a catalytic agent is capable of becoming a part of the finished product, it is usually called an "accelerator" or "hardener."

Because plastics are formulated for specific purposes, each plastic compound is somewhat limited in its applications and can be easily misused—particularly so, when it is handled by persons who expect it to be as versatile as iron or

steel. However, no one should experience difficulties in using plastics if he realizes that in only a few special applications is each compound better than other materials.

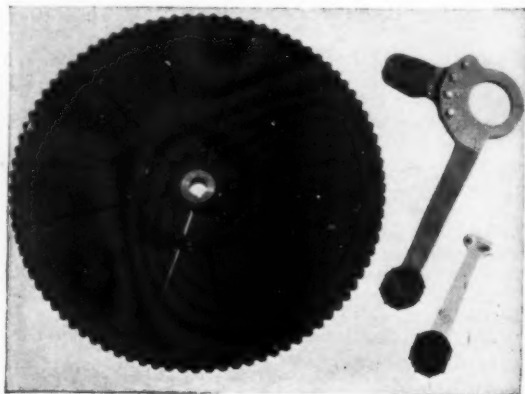
As a group, plastics are desirable because they have the following characteristics that are not common among other industrial materials:

- (1) Good chemical resistance.
- (2) Economical fabrication characteristics.
- (3) Excellent vibration resistance.
- (4) High dielectric strength.
- (5) Superior adhesive qualities.
- (6) Easy machinability.
- (7) Extreme light weight and good strength.
- (8) Simple reclaimability.

However, no one plastic has all of these qualities—at least, not to the nth degree.

Plastics do not corrode like metals, but only a few of them can be used to make containers for hydrofluoric acid. All can be damaged or dissolved by at least one corrosive or appropriately-reactive chemical. Economical fabrication characteristics can normally be expected when plastics are properly used,

These are high-strength glass-fiber plastic laminates. Because they have maximum vibration resistance, such laminates have found many applications in aircraft construction. They can be molded at very low pressures, often less than 25 p.s.i.



but even this feature must be discounted when plastics are to be employed where other materials are unsuitable. Only glass-fiber plastics have maximum vibration resistance (being, in this respect, stronger than even spring steel); and, while most resin-base materials are non-conductors of electricity, metal filled or coated plastics make poor insulators. Some plastics have almost no adhesive qualities, before or after curing, despite the fact that virtually all of the best adhesives are resin-base materials; and a few contain abrasives which will ruin the finest cutting tools, although most plastics are easier to machine than wood—having about the same hardness and no grain. Few plastics are as strong as metals, altho many have comparable strength-weight ratios plus the advantage of being lighter than either aluminum or magnesium. Most thermoplastics can be easily reclaimed by melting, but a few require special reclamation procedures and additives.

Methods of Using Plastics

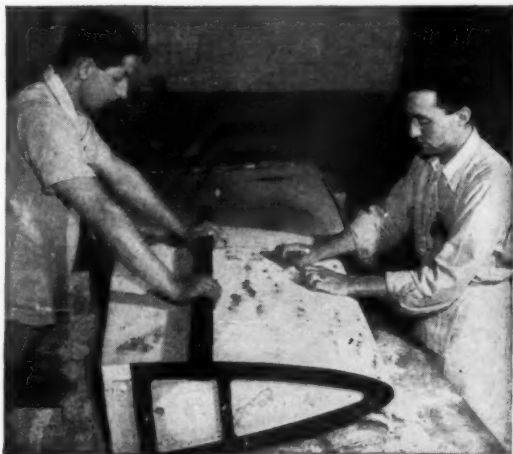
(1) COATING. Most liquid plastics can be applied before curing by dipping,

brushing, spraying, etc., with conventional equipment.

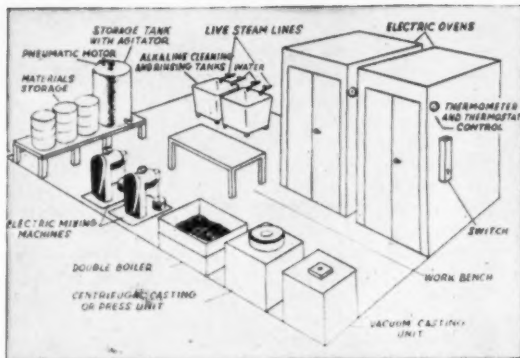
(2) CASTING. This is generally considered a manual method of pouring a liquid plastic into a mold, where it is cured by heat without pressure. Centrifugal action may be used to eliminate air bubbles. The molds are ordinarily made from inexpensive materials—e.g., wood, plaster, and low-cost plastics. Hollow casts can be made with thermoplastics by partly filling molds and tilting so that cooling and hardening will leave the materials evenly-distributed in a thin layer on the mold surfaces; also, by filling a mold and pouring off the material in the center as soon as the material adjacent to the mold surfaces is "chilled."

(3) MOLDING. This is generally considered a mass-production process, and consists of curing plastics in molds with both heat and mechanical pressure. There are two major types of plastic molding processes. The first is called "compression molding," and is accomplished with a press which is similar to the presses used in forming sheet metals except that it has heating equip-

Aircraft workers make a compound-contour master with a casting resin whose properties have been so modified with fillers that it can be troweled almost the same as concrete.



Here is a typical plastics-department layout of the type that can be adapted by many small companies without heavy investments in either materials or equipment.



ment for use in connection with thermosetting materials. The second is called "injection molding," and is usually accomplished by forcing a molten thermoplastic from a heating chamber into the cavity of a closed die. Both processes have many variations which require the use of modern high-speed presses and expensive steel dies, but can be adapted for small-scale or inexpensive methods of production when casting processes do not provide adequate results.

(4) **LAMINATING.** This consists of impregnating sheets or layers of paper, cloth, or some other material with a plastic adhesive or binder and compression-molding two or more of those impregnated layers so that they will comprise a new sheet or molded article with improved strength and other desirable physical properties.

(5) **FINISHING.** A plastic article may normally be considered finished as soon as it is cured in a mold. However, when small tolerances are required or where special design considerations necessitate variations, it may be machined as previously suggested, polished, coated with other materials, or electroplated. Also, some types of plastics are prefabricated in sheet, rod, tube, and other forms so that they may be used in shops where no special fabrication equipment is avail-

able—much the same as steel and other sections are used.

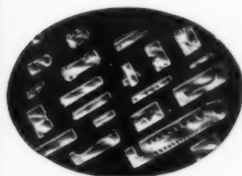
General Types of Plastic Materials

(1) **ACRYLICS.** Most important of these are transparent thermoplastics, made from methyl methacrylate resins, and are commonly known by Lucite and Plexiglas trade names. They can be molded, cast, extruded, or used in protective coatings and adhesives. Shops which cannot afford expensive layouts of special equipment usually buy them in prefabricated forms. They can be prepared in translucent or opaque colors, or dyed after fabrication. They have been widely used in the manufacture of airplane windshields because they have good flexural strength—enough to deflect a machine gun bullet that does not collide head-on—combined with chemical inertness and resistance to discoloration in the presence of strong sunlight. The latter item is important, because many plastics tend to yellow or change colors when they are exposed to strong sunlight for prolonged periods of time. Acrylics are not as widely-used as they might be, because they are comparatively expensive. Following are properties of typical methyl-methacrylate resins:

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1. Specific Gravity	1.19	1.17
2. Grams per cu. in.....	19.51	19.19
3. Refractive Index, N_d	1.49	1.50
4. Strength, Tensile, lbs. per sq. in.....	7,000	7,000
5. Modulus of Elasticity, lbs. sq. in. x 10^5	4	4
6. Strength, Compressive, lbs. per sq. in.....	15,000	15,000
7. Strength, Flexural, lbs. per sq. in.....	15,000	15,000
8. Strength, Impact, ft. lbs. per notch in.....	.35	.35
9. Hardness, Brinell, 500 kg.....	18—25	18—25
10. Thermal Conductivity, 10^{-4} cal. sec. °C.....	5—7	5—7
11. Specific Heat, cal. per °C gram.....	.35	.35
12. Thermal Expansion, 10^{-5} per °C.....	6—8	6—8
13. Operating Temperature, Top, °F.....	162	147
14. Softening Point, °F.....	203	174
15. Distortion under Heat, °F.....	—	—
16. Cold Flow	—	Slight
17. Volume Resistivity, ohms cms.....	10^{15}	10^{15}
18. Dielectric Strength, volts per mil.....	480	480
19. Dielectric Constant, 60 cycles.....	3.6	3.6
20. Dielectric Constant, 10^3 cycles.....	3.0	3.0
21. Dielectric Constant, 10^6 cycles.....	2.8	2.8
22. Power Factor, 60 cycles.....	.07	.07
23. Power Factor, 10^3 cycles.....	.07	.07
24. Power Factor, 10^6 cycles.....	.015	.015
25. Water Absorption, % in 168 hrs.....	.4	.4
26. Medium Dispersion0088	.0088
27. Dispersive Power0174	.0174
28. Elongation, %	5—15	5—15

(2) ALKYDS. These are the resins most widely used in the manufacture of paints, varnishes, lacquers, adhesives, and related compounds. However, they are of little practical value to the non-specialized manufacturer and need not be considered here.

(3) ALDEHYDES. This is probably the largest and most popular group of plastics. It includes the phenol-formaldehydes (also called "phenolics"), phenol-furfuraldehydes, resorcinol-formaldehydes, urea-formaldehydes, cresol-acetaldehydes, etc., among which are both thermosetting and thermoplastic materials which may be adapted to vir-

tually all methods of fabrication and applications heretofore mentioned. Especially useful in shops that lack special equipment are phenol-formaldehyde casting resins which can be readily compounded, cast, and cured with a wide variety of shapes and physical properties in low-cost molds. Most of the phenolics now available have translucent or opaque colors, but these materials can be manufactured with as much glass-clear transparency as acrylics. They are not as expensive as most plastics, yet have comparatively high physical properties without fillers of any type. Following are physical properties of a wood-filled phenolic molding:

1. Specific Gravity, 25°/25° C.....	1.36
2. Grams per cu. in.....	22.2
3. Refractive Index, N_d	Opaque
4. Strength, Tensile, lbs. per. sq. in.....	8,500



Rockford Hy-Draulic Shaper-Planer with special Duplicating Unit. Master com (1) on rail, reproduces contour of work-piece (2) in vise.

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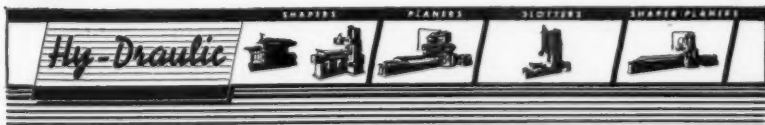
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5. Modulus of Elasticity, lbs. per sq. in. x 10^5	9.6
6. Strength, Compressive, lbs. per sq. in.....	25-30,000
7. Strength, Flexural, lbs. per sq. in.....	10,000
8. Strength, Charpy Impact, ft. lbs. per notch inch.....	.32
9. Hardness, Brinell, 25 kg.....	30-45
10. Thermal Conductivity, 10^{-4} cal. sec., cm. °C.....	4-7
11. Specific Heat, cal. per °C. per gram.....	.38
12. Thermal Expansion, 10^{-5} per °C.....	3-4
13. Operating Temperature, °F.....	280
14. Softening Point, °F.....	None
15. Distortion under Heat, °F.....	Over 275
16. Cold Flow	None
17. Volume Resistivity, ohm cms.....	1.7×10^{11}
18. Dielectric Strength, volts per mil.....	350
19. Dielectric Constant, 60 cycles.....	10
20. Dielectric Constant, 10^3 cycles.....	7
21. Dielectric Constant, 10^6 cycles.....	6
22. Power Factor, 60 cycles.....	.3
23. Power Factor, 10^3 cycles.....	.12
24. Power Factor, 10^6 cycles.....	.05
25. Loss Factor, 300 kilocycles, %.....	3.0
26. Loss Factor, 10^3 cycles.....	.84
27. Loss Factor, 10^6 cycles.....	.30
28. Water Absorption, %.....	.8

(4) **BITUMENS.** These are the so-called "cold-molding compounds" in which asphalt, cold-tar pitch, Gilsonite, pine tar, etc., serve as the resin binders for fillers such as asbestos fibers. They are made into finished articles with high-pressure presses and requires little or no heat curing. They have good heat

resistance after molding and are comparatively inexpensive, but are impractical whenever dimensional accuracy is desirable. Variations in straight bituminous cold-molding compounds are achieved by using Portland cement and various plastic resins, such as phenolics, for binders. Resultant physical properties may be compared as follows:

	BITUMEN	RESIN	CEMENT
Tensile Strength	700-1,000 lbs. sq. in.	2,000- 2,500 lbs. sq. in.	1,200- 1,500 lbs. sq. in.
Compressive Strength....	3,000-4,000 lbs. sq. in.	12,000-13,000 lbs. sq. in.	15,000-18,000 lbs. sq. in.
Modulus of Rupture.....	1,200-1,500 lbs. sq. in.	4,000- 6,000 lbs. sq. in.	4,500- 5,500 lbs. sq. in.
Impact (Izod)4	.4	.4
Rockwell Hardness			
14 $\frac{1}{2}$ " Ball	10-20	40-50	60-80
100 Kg. Load, B Scale			
Dielectric Strength	50-100 volts per mil.	100 volts per mil.	75-100 volts per mil.
Water Absorption	1-3% 48 hrs.	$\frac{1}{2}$ -1% 48 hrs.	3-12% 48 hrs.
Specific Gravity	1.9-2	2-2.5	2-2.5
Standard Color	Black-Brown	Brownish Yellow-Black	Light Grey-Black
Distortion under Heat...	Slight after 400° F.	None up to 300° F.	None up to 1,000° F.
Heat Resistance			
before change	600° F.	400° F.	1,500° F.
Chemical Resistance	Resistant to all acids	and alkalis unless concentrated	and above 70° F.
Arc Resistance	Good	Low	High

(5) **CELLULOSICS.** These comprise another large and popular family of plastics, all members of which are de-

rived from vegetable fibers (especially cotton and wood-pulp fibers). Among the best-known cellulosics are benzyl

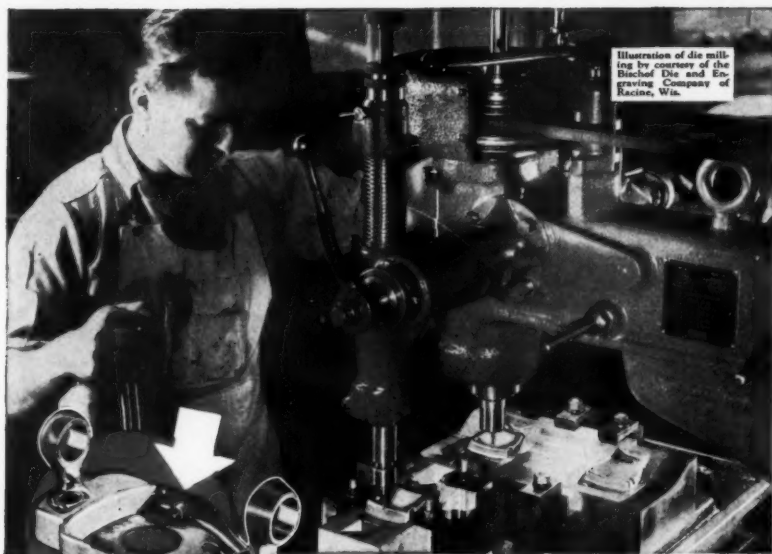


Illustration of die milling by courtesy of the Diecast Die and Engraving Company of Racine, Wis.



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A Gorton Super-Speed Tracer-Controlled Milling Machine with adjustable ram together with a super-speed spindle made it possible to mill to a depth of $\frac{1}{2}$ " with a $\frac{1}{16}$ " dia. cutter (producing thin wall in finished die casting; see arrow). This was for the main frame for a vibrating hand massager manufactured by the John Oster Manufacturing Company of Racine, Wis. Only one Master model was used to mill a two-cavity die casting die with a minimum of hand finishing—this is typical of Gorton Tracer-Controlled equipment.

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- Method: Two machine settings per cavity without resetting work.
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cellulose, cellulose acetate, cellulose acetate butyrate (an ingredient in most lacquers and airplane dopes), cellulose nitrate, ethyl cellulose, etc.—trade names for which include such names as Celluloid, Cellophane, Ethocel, Lumarith, Tenite, Nitron, etc. They are used in compounding adhesives and protective coatings of many different types,

and can be molded into numerous glass-clear transparent or opaque-colored articles. However, the shop with no special handling equipment can normally make use of them only in prefabricated forms. Probably the most versatile cellulostic molding material is cellulose acetate, a thermoplastic, and its average physical properties after curing are as follows:

	Improved	Standard
1. Specific Gravity	1.27—1.37	
2. Grams per cu. in.....	20.8—22.5	
3. Refractive Index, N_d	1.47—1.50	
4. Strength, Tensile, lbs. per sq. in.....	2,800—10,000	
5. Modulus of Elasticity, lbs. sq. in. $\times 10^5$6—3.5	
6. Strength, Compressive, lbs. sq. in.....	11,000—27,000	
7. Strength, Flexural, lbs. sq. in.....	5,000—16,000	
8. Strength, Impact, ft. lbs. per notch in.....	.7—4.2	
9. Hardness, Brinell, 10 kg., 2.5 inch ball.....	8—15	
10. Thermal Conductivity, 10^{-4} cal. sec. cm. $^{\circ}\text{C}$	5.4—8.7	
11. Specific Heat, cal. per $^{\circ}\text{C}$	3—45	
12. Thermal Expansion, 10^{-5} per $^{\circ}\text{C}$	14—16	
13. Operating Temperature, $^{\circ}\text{F}$ (continuous).....	140—180	
14. Softening Point, $^{\circ}\text{F}$	122—205	
15. Distortion under Heat, $^{\circ}\text{F}$	122—212	
16. Cold Flow	Slight	
17. Volume Resistivity, ohms cms.....	(1—6) $\times 10^{12}$	
18. Dielectric Strength, volts per mil.....	350—400	
19. Dielectric Constant, 60 cycles.....	4.9—6.2	
20. Dielectric Constant, 10^3 cycles.....	4.5—6.0	
21. Dielectric Constant, 10^6 cycles.....	4.0—5.0	
22. Power Factor, 60 cycles.....	.01—.04	
23. Power Factor, 10^3 cycles.....	.02—.06	
24. Power Factor, 10^6 cycles.....	.035—.06	
25. Water Absorption, % by wght.—24 hrs.....	2.1—6.9	
26. Elongation, %	15—80	

(6) PROTEIN PLASTICS. These are complex nitrogenous compounds derived from the amino acids of living organisms. Foremost among them are rennet caseins, usually made from cows' milk or blood albumen, and their greatest merit is low cost. They are used in compounding adhesives, as molding compositions, and as extrusion materials. Finished protein-plastic articles generally do not have great strength or close dimensional accuracy, but may be attractively transparent or opaque in

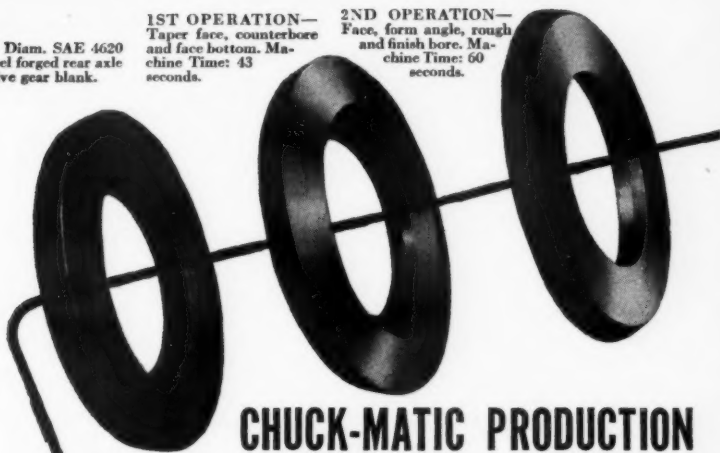
appearance with any of numerous colors. Their potential industrial applications are seemingly few, although they are widely used in cheap consumer products and may be obtained in many prefabricated forms.

(7) CUMARONE-INDENES. These plastics alone are of little value, since they tend to be weak and brittle after curing, but they are extremely useful in combinations with other resins—being widely used in the preparation of commercial molding compounds, rub-

8" Diam. SAE 4620
steel forged rear axle
drive gear blank.

1ST OPERATION—
Taper face, counterbore
and face bottom. Ma-
chine Time: 43
seconds.

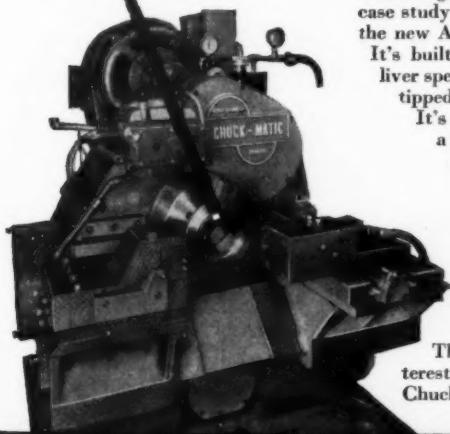
2ND OPERATION—
Face, form angle, rough
and finish bore. Ma-
chine Time: 60
seconds.



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It's built *rugged*—and *powerful*—to deliver speeds and feeds as fast as carbide-tipped tools can take it.

It's built for *high production*—with a minimum of idle movement and plenty of accessibility for quick setups, easy loading, easy adjustment.

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ber products, protective coatings, and adhesives. As a rule, they serve as modifiers which reduce the costs of other resins without appreciably altering physical properties.

(8) DIALLYL PHTHALATES. These are among the more remarkable new plastics and should become very important if or when they can be handled

and cured with comparative speed and ease. They can be cast, molded, laminated and compounded with numerous other materials. Their finished products have unusually fine physical properties, and may have any of glass-clear to opaque colors. The physical properties depend on the time used in curing, as indicated by the following table for diallyl phthalate castings:

	Cure Cycle		
	144-Hour	48-Hour	6-Hour
Tensile Strength, psi.	7,500-9,000	6,000-8,000	4,900-7,300
Modulus in Tension, psi. ($\times 10^{-6}$)	.40-.50	.37-.46	.23-.36
Per Cent Elongation	2.4-2.9	1.7-2.2	2.0-2.8
Compressive Strength, psi.	24,000-29,000	20,000-26,000	23,000-29,000
Per Cent Deformed at Ultimate Compression	27-4-	15-30	35-41
Yield Point in Compression, psi	14,300-19,600	17,500-19,500	11,000-13,700
Per Cent Deformed at Compressive Yield Point	5.0-7.8	5.5-7.6	5.4-6.5
Izod Impact Strength, ft. lb./in. of Notch	4-5	4-5	4-5
Barcol Hardness	37-46	45-47	31-35
Rockwell Hardness "M" Scale	119-117	118-118	102-109
Heat Distortion Point, °C	85-105	106-121	58-60
Light Transmission at 425 mp. %	69-85	77-84	80-85
After outdoor exposure ² 7 days	58-67	62-66	60-65
After outdoor exposure ² 35 days	55-65	60-64	60-64
Refractive Index, N 20/D	1.572	1.572	1.572
Refractive Dispersion (nF-nC) $\times 10^4$	168-170	168-169	169-171
Density 20/4	1.27	1.27	1.27
Burning Rate, inches per min.	.5-.6	.5-.6	.5-.6

1.) All tests conducted by appropriate ASTM procedures.

2.) Facing South, inclined 45° at Emeryville, California.

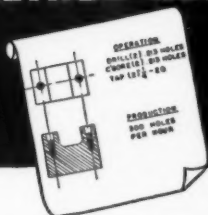
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(9) ELASTOMERS. These are the flexible or rubber-like plastics, many of which are derived from other groups listed here. The best-known types are buna-n, buna-s, butyl, neoprene, and thiokol—all thermosetting materials which resemble rubber so that they are designated "synthetic rubbers." Newer and possibly more remarkable are castable thermo-plastic elastomers of the vinyl family whose salient characteris-

tics were recently described in this magazine in connection with the fabrication of flexible molds for the casting of low-temperature compounds.

(10) LIGNINS. These are plastics derived from wood, and are normally sold only in the form of finished sheets or panels for building purposes. However, they have been combined with synthetic rubbers to make molding compositions

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for gaskets which are both durable and economical.

Nylons, and they include excellent molding compositions as well as high-quality fabrics. Nylon molding compositions are ordinarily injection molded.

(11) POLYAMIDES. These are the

Physical Properties of Polyamides

1. Specific Gravity	1.06—1.19
2. Grams per cu. in.....	18.7
3. Refractive Index, N_d	1.53
4. Strength, Tensile, lbs. per sq. in.....	5,000—8,500
5. Modulus of Elasticity, lbs. per sq. in. $\times 10^5$	4.5
6. Strength, Compressive, lbs. sq. in.....	—
7. Strength, Flexural, lbs. per sq. in.....	10,000—15,000
8. Strength, Impact, ft. lbs. per notch in.....	—
9. Hardness, Rockwell	L95—L100
10. Thermal Conductivity, 10^{-1} cal. sec. $^{\circ}\text{C}$	—
11. Specific Heat, cal. per $^{\circ}\text{C}$ gram.....	.55
12. Thermal Expansion, 10^{-5} per $^{\circ}\text{C}$	10
13. Operating Temperature, Top, $^{\circ}\text{F}$	—
14. Softening Point, $^{\circ}\text{F}$	450
15. Distortion under Heat, $^{\circ}\text{F}$	—
16. Cold Flow	—
17. Volume Resistivity, ohms cms.....	10^{13}
18. Dielectric Strength, volts per mil.....	—
19. Dielectric Constant, 60 cycles.....	3.2
20. Dielectric Constant, 10^3 cycles.....	3.3
21. Dielectric Constant, 10^6 cycles.....	3.6
22. Power Factor, 60 cycles.....	.01
23. Power Factor, 10^3 cycles.....	.015
24. Power Factor, 10^6 cycles.....	.022
25. Water Absorption, % in 24 hrs.....	7.6
26. Elongation, %	30—35

• • •

(12) POLYSTYRENE. This is a transparent thermo-plastic resin, closely related to the vinyls which will be discussed presently. It is used to manufac-

ture excellent molding compounds, films, extrusions, coatings, and laminates. Alone, it is useful mainly as a molding compound.

Physical Properties of Polystyrene

1. Specific Gravity	1.07
2. Grams per cu. in.....	17.5
3. Refractive Index, N_d	1.59
4. Strength, Tensile, lbs. per sq. in.....	5,000—9,000
5. Modulus of Elasticity, lbs. per sq. in. $\times 10^5$	1.7—2.6
6. Strength, Compressive, lbs. per sq. in.....	13,000
7. Strength, Flexural, lbs. per sq. in.....	14,000—19,000
8. Strength, Impact, ft. lbs. per notch in.....	.35—50
9. Hardness, Brinell, 25 kg.....	20—30
10. Thermal Conductivity, 10^{-4} cal. sec. cm. $^{\circ}\text{C}$	1.9



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GREATER STRENGTH · BETTER FIT HAND TOOLS

11. Specific Heat, cal. per °C per gram.....	.32
12. Thermal Expansion, 10^{-5} per °C.....	6-8
13. Operating Temperature, Top, °F.....	160
14. Softening Point, °F.....	190-230
15. Distortion under Heat, °F.....	165-190
16. Cold Flow	Slight
17. Volume Resistivity, ohms cms.....	10^{15}
18. Dielectric Strength, volts per mil.....	500-700
19. Dielectric Constant, 60 cycles.....	2.6
20. Dielectric Constant, 10^3 cycles.....	2.6
21. Dielectric Constant, 10^6 cycles.....	2.6
22. Power Factor, 60 cycles.....	Less than .00002
23. Power Factor, 10^3 cycles.....	.0001-.0002
24. Power Factor, 10^6 cycles.....	.0001-.0002
25. Loss Factor, 60 cycles.....	Less than .0002
26. Loss Factor, 10^3 cycles.....	.00026-.00052
27. Loss Factor, 10^6 cycles.....	.00026-.00052
28. Water Absorption-24 hrs.	Less than .00052
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30. Resistance to concentrated acids and bases.....	.05%
31. Weather-exposure for 1 year-slight yellowing and loss of gloss.....	Excellent
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33. Arc Resistance (Proposed A.S.T.M Method).....	87%-91%
34. Elongation, %	240 Sec.
	2-5

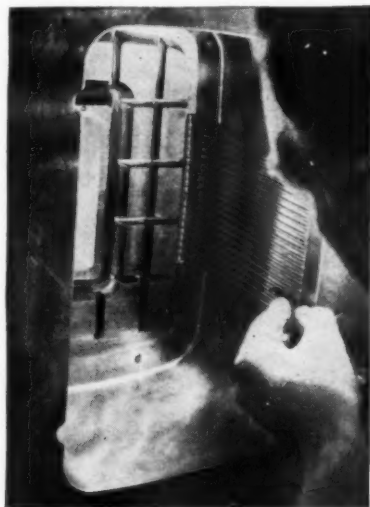
. . .

(13) **SILICONES.** These are among the more recent plastic developments, all of which are based on a silicon-type resin and which are characterized by an unusual range of temperature resistance. However, the only member of the family that can now be considered important in a general industrial sense is a lubricant which protects and provides excellent release characteristics for many types of metal dies—including those that have been used to injection-mold steel.

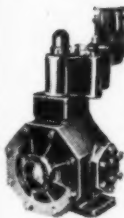
(14) **UREAS.** These are resins made with uric acids. Most important of the group is urea-formaldehyde whose general characteristics are mentioned in connection with aldehyde plastics.

(15) **VINYLS.** These comprise another

• • •
An expensive steel die for compression molding is hand finished at General Electric Company. It will be used to make plastic radio cabinets.



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Racine Variable Volume Oil Hydraulic Pump with solenoid operated 2-pressure control. These pumps supply the power for shearing, punching and trimming spring leaves that are fabricated by this press. Fifty foot bars are fed into one end of the press. A complete spring is fabricated on each cycle.

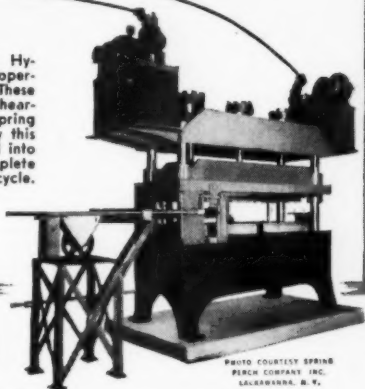


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of the largest plastic groups and include such compounds as polyvinyl acetate, polyvinyl chloride, polyvinyl chloride-acetate, polyvinyl acetals (or polyvinyl aldehyde reaction products), and vinylidene chloride. They may have any of transparent or opaque colors, and are most useful as molding compounds or as coating and adhesive ingredients. However, most of them can be obtained in prefabricated forms for industrial applications in shops that do not have special fabrication equipment.

(16) **VULCANIZED FIBERS.** These are inexpensive molding compositions which may be obtained in prefabricated forms. They are made by chemically hydrolyzing fine cotton fibers, usually with zinc chloride solutions, and are somewhat bonelike after curing. They have high physical and dielectric strength properties, and can be readily machined.

(17) **ZEIN PLASTICS.** These are comparatively recent protein materials,

made from the proteins in maize. They are said to be more soluble in most solvents than the casein plastics. For this reason, they are used in the manufacture of textiles and in compounding other plastics. **THE END.**

• • •

A casting plastic is poured into a plaster piece mold for hardening without pressure.



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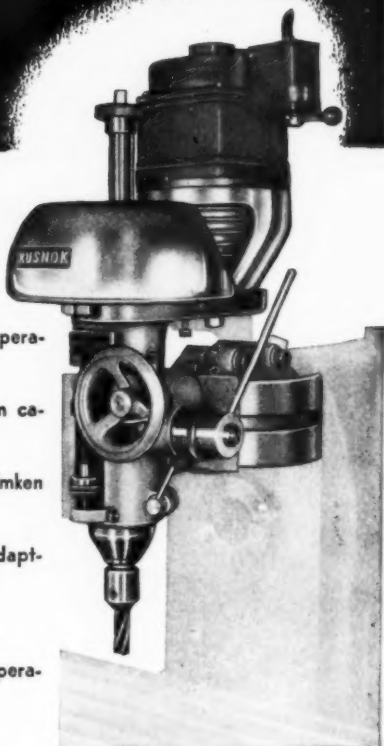
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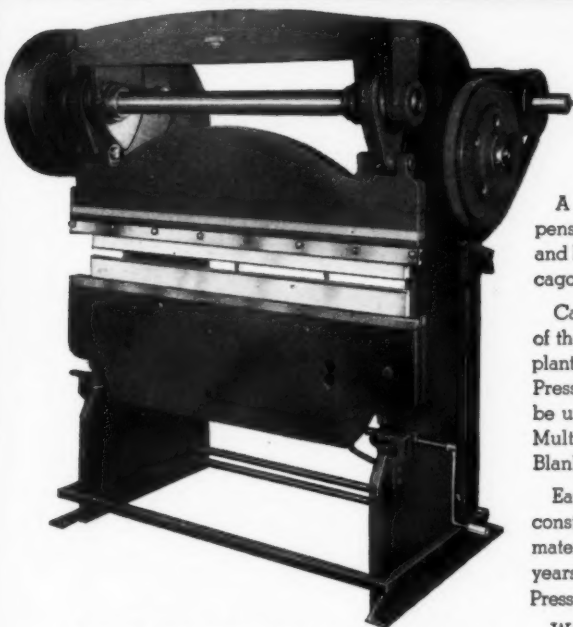
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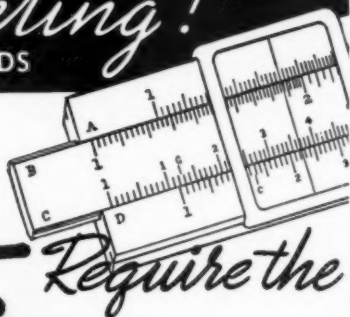
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Stamping Body Panels at Kaiser-Frazer

Three to nine stamping operations are required to turn out each body panel. Larger body presses range in capacity from 350 ton single-action to 1,500 ton triple-action.

In the same Willow Run plant area where giant presses turned out aluminum parts for B-24 bombers, 27 larger body presses are now stamping steel panels for rapidly increasing production of the 1947 Kaiser, Frazer and Manhattan automobiles.

The Kaiser-Frazer behemoths, installed in the record time of 14 months, range in capacity from a battery of 350-ton single-action units to a gigantic 1,500-ton triple-action press. Including

both Hamilton and Clearing models, the Willow Run press capacity is supplemented by smaller Warco and Hydro-Pierce units, and McKay rolling equipment. Overhead cranes of 30-ton capacity handle movement of dies and steel stock.

First of the new presses to go into operation at the Willow Run plant were the five Hamiltons. They were installed in the same press pit which held the bomber stamping units, and were completed last summer. Consisting of three

• • •

This Hamilton press pierces rear window apertures in roof panels for the Kaiser and Frazer automobiles. Dies on each side of the 800-ton stamping machine are set so that two stampings can be simultaneously pierced.



800-ton single-action and two 1,200-ton triple-action models, the Hamiltons were operating while excavation of an adjacent pit for the 22 Clearing presses was undertaken.

Installation of the Clearings was accomplished in January of this year, and the completed Press Division now is turning out a majority of all the major stampings needed for the Kaiser, Frazer, and Manhattan automobiles with the exception of doors and trunk lids, which

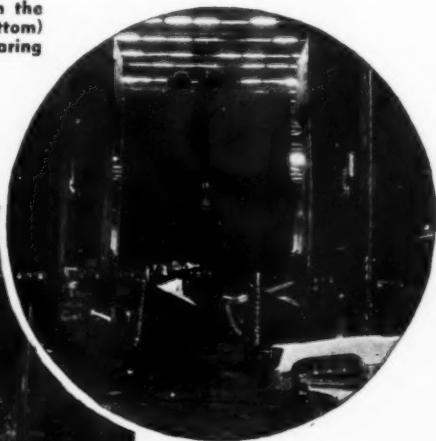
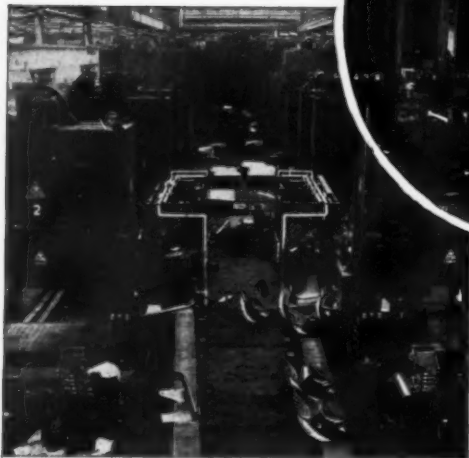
are obtained from an outside supplier.

The Clearing press equipment includes fourteen 350-ton presses; five 750-ton presses; two 900-ton presses, and one 1,500-ton unit. The 1,500-ton press is a triple-action model, and the five 750-ton units are double-action.

Die bed areas range up to 200 x 100 inches, so that the largest size stampings can be turned out intact, and full use of multiple die-cycle possibilities can be made.

(Right, insert) This is a view of a section of the new Clearing press installation in the Willow Run plant of Kaiser-Frazer Corp. In the background is a 900-ton press while several 350 and 750 behemoths are shown on either side of the center stock lane. The stampings in the picture are rear quarter panels. (Bottom) This is a view of some of the 22 Clearing

presses, installation of which was recently completed in the Willow Run plant of Kaiser-Frazer Corp. Stampings in the foreground are front fenders for the Kaiser and Frazer automobiles.



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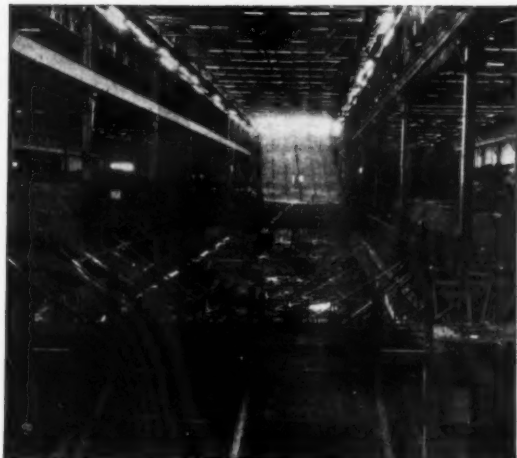
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With the press pit appearing at the bottom, this photograph shows an interior view of the 280 by 60 foot roof section of the Willow Run plant of Kaiser-Frazer Corp. which was raised to provide overhead clearance for 21 recently installed giant body presses. At this point, the roof section had been raised by screw-jacks about seven of the 13 feet which it was elevated. Supporting columns for the roof section were bolted to the tops of major plant columns shown along the sides of the pit.



Produced in drawing quality especially for press work, the 18-gauge sheet steel stock is received from Portsmouth Steel Corp. and other suppliers in varied sizes up to the 74 x 49 inch sheets which are used to form turret tops.

Sheets of this stock are first blanked in two of the 350-ton Clearings at the head of the press line which are devoted exclusively to this work.

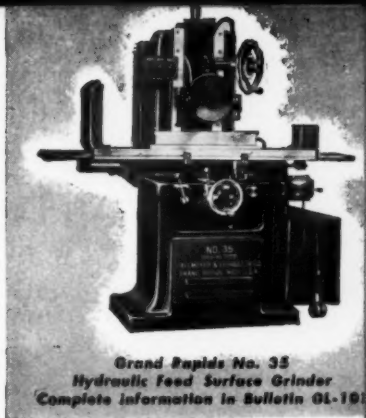
The blanked sheets then are cleaned and flexed in a McKay roller located adjacent to the blanking presses. Fed through this unit a sheet at a time, the

stock is automatically scrubbed with kerosene and "softened" in the roller mechanism. A flexing roll forces the sheet to take a sharp upward curve as it speeds through the machine. A further series of steel leveling rolls straightens the sheet, completing its preparation for forming on the body presses. The whole operation, from cleaning to leveling, takes only a few seconds.

In pallets, the flexed sheets then are delivered by crane to the stock area of the press in which they are to receive

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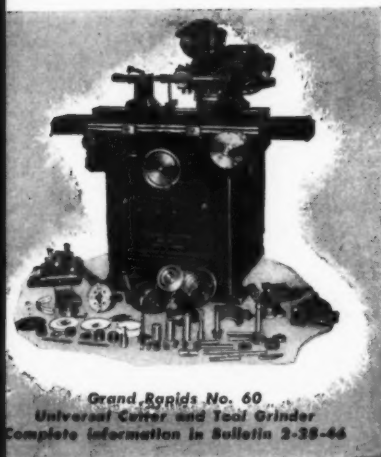
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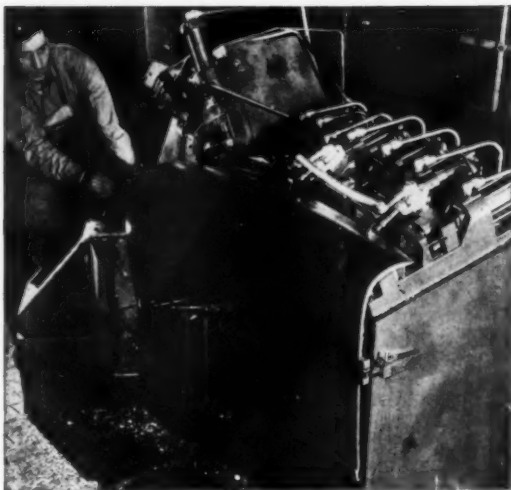
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• • •

This Hydro-Pierce machine pierces holes in the top flange of left front fenders for Kaiser and Frazer automobiles in the K-F Willow Run plant.

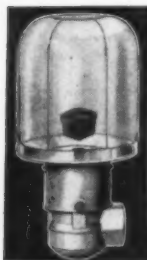
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the first draw. The five Hamiltons are used primarily for the roof, hood and pillar post jobs, while the adjacent twin lines of Clearings are currently assigned to forming of front fenders, quarter panels, windshield inner frames and floor panels.

It requires from three to nine stamping operations to turn out each different body panel. For example, a series of nine different dies set in four different Clearing presses and one Warco are needed to produce the inner frame

windshield panel. In sequence, these stamping operations are (1) the draw; (2 and 3) trim right and left sides; (4) flange; (5, 6 and 7) piercing of holes; (8) restrike, and (9) flange. Routine spot inspections follow all major press operations, since close dimensional tolerances must be held to guarantee proper fitting of panels on the body assembly lines. This importance is illustrated by the center pillar post stampings, which, when joined to the roof and



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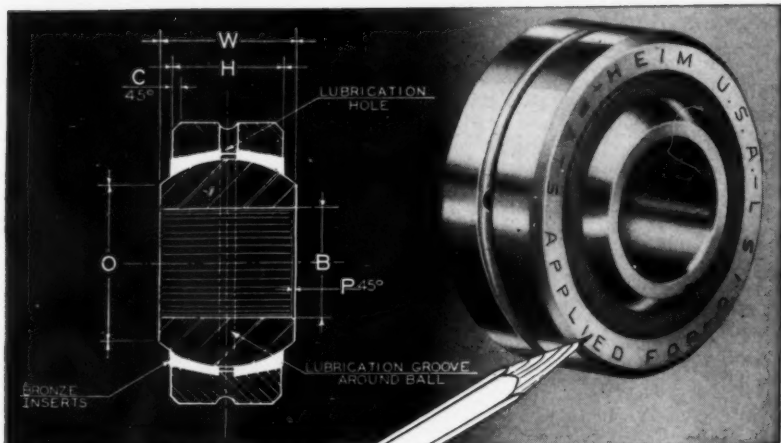
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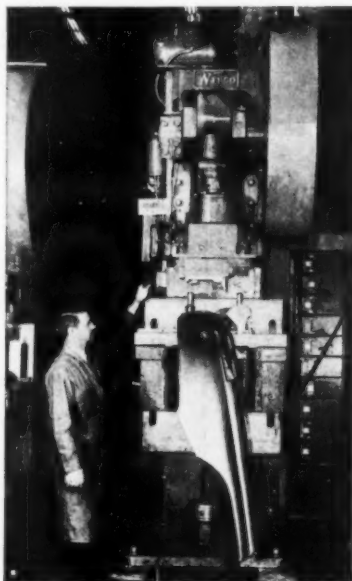
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floor panels, predetermine door fitting clearances. A variation in overall length of only 1/16 inch is permitted on this three-foot panel, and equally close tolerances must be held in respect to the hole and contour dimensions.

Increasing capacity and contributing toward efficiency in the operation of the Press Division is the wide use of multiple dies so that from two to four operations can be accomplished with each press stroke. A particularly noteworthy example of this mode of operation is in the restrike, trimming and flanging and the right and left side piercing of the pillar posts. Operators move the stampings through the pro-

• • •

Rear quarter panels for Kaiser and Frazer automobiles are pierced on this 100-ton Warco press, one of six smaller stamping units installed in the Kaiser-Frazer press division.



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gressive die cycle so that a completed pillar post is removed from the die bed area each time a stamping is placed in the restrike die to start the cycle.

Another example is the trimming and piercing of one end of the roof panel on one side of a Hamilton, while the other end of another roof panel is simultaneously trimmed and pierced on the other side of the press. Still another is in the working of the hood panel, which requires an exceptionally deep draw. A three-die cycle is set up in one of the 900-ton Clearings so that a progressively deeper draw on three hoods is accomplished with each press stroke.

In addition to the 27 Clearings and Hamiltons, there are six smaller Warco presses and two Hydro-Pierce machines which are strategically located along the Clearing press line to perform lighter flanging and piercing operations.

The entire stamping division, equipped with the most modern equipment which today's press industry can provide, is

laid out to achieve straight-line production flow from receiving of sheet stock, to blanking presses, to flexing machine, to forming presses, to sub-assembly and balloon-assembly welding operations without unnecessary handling.

An interesting feature of the Hamilton unit is that they are completely equipped with automatic lubricating systems which grease moving parts with each stroke of the press. The Trabon systems located on each press lubricate 90 bearings on the three single-actions and more than 200 on each of the two 1,200-ton triple-action units. With most of their operating mechanism below floor level, the Hamiltons deliver their die bed pressure through the "pull down" principle.

Installation of the 22 Clearing presses necessitated the elevation of a section of the plant roof 280 feet long and 60 feet wide a distance of 13 feet. Through the use of screwjacks mounted on reinforced columns, the 252-ton section was raised intact without disturbing the lighting and power installations built into it. The roof-raising was necessary to provide clearance above the 30-foot Clearing presses for overhead crane facilities.

Excavation of the pit called for the removal of some 600,000 cubic feet of earth. Approximately 400 tons of concrete and 200 tons of steel reinforcing rods then were used in building the floor and walls of the giant "basement." The End.

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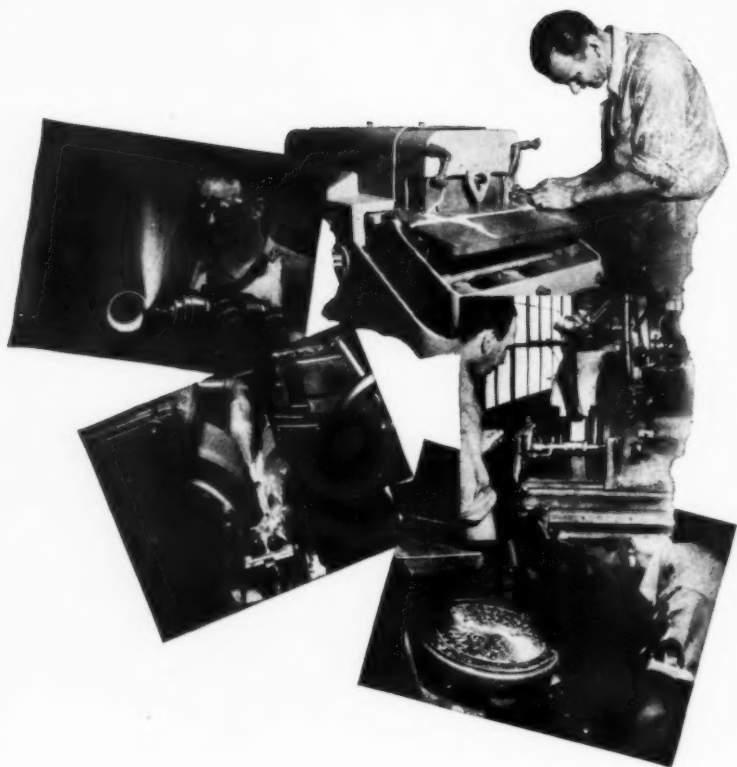
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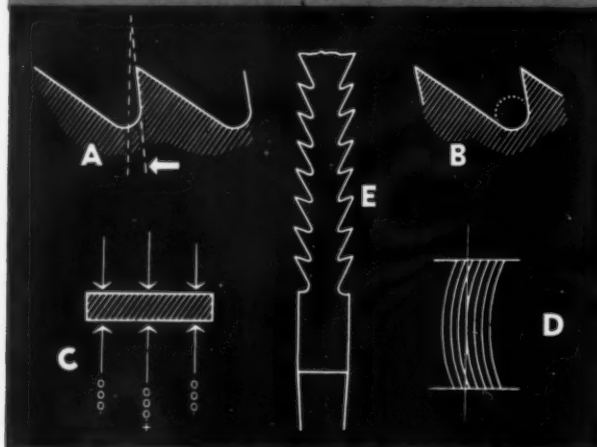
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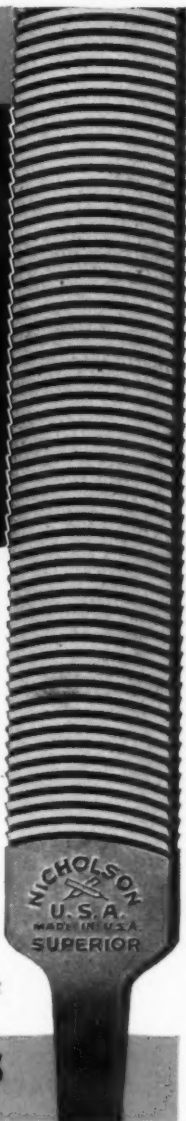


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OPERATION OF AN ENGINE LATHE



This is a continuation of a series of articles begun in the April issue of **MACHINE AND TOOL BLUE BOOK**. This material is part of an over-all campaign by the Shell Oil Company to acquaint industry with the most efficient uses of engine lathes. Previous articles have featured the parts of the lathe that hold the workpiece and control its motion, or rotating speed and the parts of a lathe that hold the tool and control its movement, or rate of feed. It is hoped that old timers as well

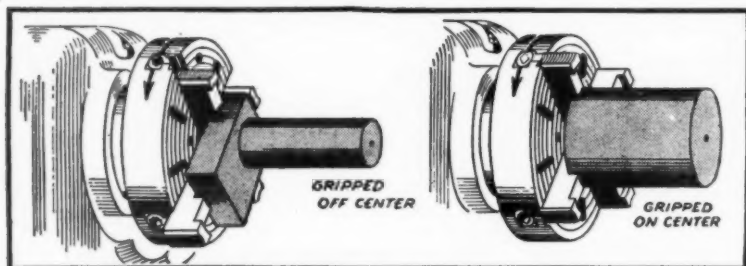
as newcomers to the metalworking field will find these articles stimulating. This material is reprinted, by permission, from the Shell Oil Company's book *Changing the Shape of Metals With an Engine Lathe*.

(This is part I of the section on Various Ways of Accurately Mounting Workpieces of Different Shapes and Sizes, to Permit Different Cutting Operations. Part 2 of this section will appear in the July issue of **MACHINE AND TOOL BLUE BOOK**.)

VARIOUS WAYS OF ACCURATELY MOUNTING WORKPIECES OF DIFFERENT SHAPES AND SIZES, TO PERMIT DIFFERENT CUTTING OPERATIONS

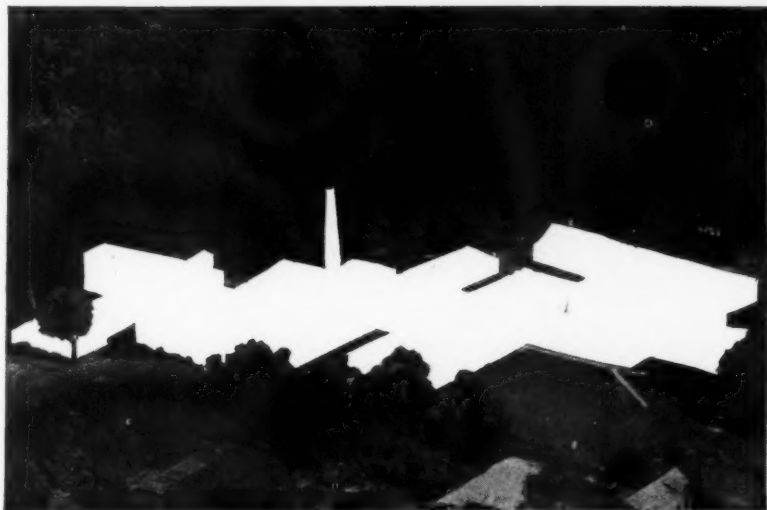
The manner in which a workpiece should be mounted on a lathe for the most efficient production results is determined by many different factors, all of which must be taken into account. Some of these factors are: The size and the shape of the workpiece, the nature of the operation to be performed, the area and location of the workpiece surface to be worked, etc. These factors in turn determine what steps should be taken to assure the accuracy of mounting necessary to accomplish the desired results.

Some workpieces should be chucked because of their size, or shape, or the nature of the operation to be performed. This means that they are gripped and rotated by one of several devices called chucks, which are attached to the headstock spindle.



A workpiece of irregular shape at the end to be gripped, or a cylindrical piece that is short and heavy, on which the operations to be performed will clear the chuck jaws, is generally chucked in a 4-jaw chuck. This type of chuck is selected because its four jaws grip the workpiece at four points and exert a great amount of gripping pressure, due to the pressure-type thread by which they are actuated. Further, because the jaws are operated independently of each other, they may be adjusted to conform with the shape of the workpiece, no matter how irregular it may be.

While a 4-jaw chuck will grip a workpiece securely, and hold the surface to be worked in proper position, its design presents both disadvantages and advantages. The main disadvantage is that individual jaw adjustments must be made to bring the center line of the section of the workpiece to be machined to an on-center position, and this requires careful checking to assure accuracy. The main advantage lies in the fact that such adjustments are possible, and as a result a high degree of centering accuracy can be accomplished. Thus, if the workpiece is relatively



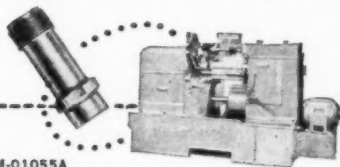
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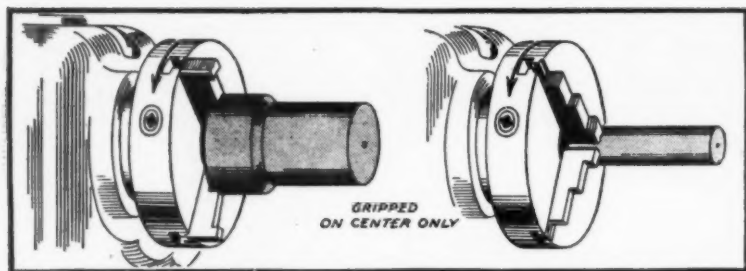
total of eleven tools work on this piece which is threaded and cut off in the last position, and close limits of concentricity must be maintained between threads and bore. Regular day by day production: 312 pieces per hour.



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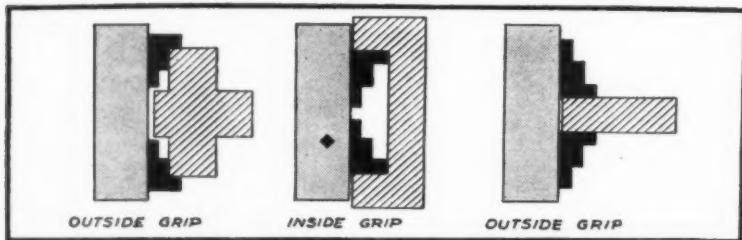
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short and heavy, or if its shape is irregular, or if centering accuracy is important, or if an operation is to be performed on its end surface, a 4-jaw chuck may be used to advantage.

A cylindrical workpiece that is relatively short, especially if it is to be held in position for an operation on its end surface, or if it is to be center-drilled for between-center turning, is generally chucked in a 3-jaw chuck. This type of chuck grips the workpiece from three sides, and its jaws are advanced toward the chuck center at an equal rate because they are all actuated by a single "scroll" mechanism. Thus, the workpiece is automatically brought to an on-center position when gripped by the jaws. All three jaws are moved simultaneously by a chuck key, or wrench.

Although a workpiece chucked in a 3-jaw chuck is supposed to be in an on-center position, it may actually be held slightly off center because of wear in the scroll mechanism. If this is the case, no individual jaw adjustment is possible, as in a 4-jaw chuck, but shims may be inserted between the jaw and workpiece on the low side. However, if a cylindrical workpiece is to be center-drilled for turning between centers, a 3-jaw chuck is often used. Any slight inaccuracy in the position of the center hole that the chuck may cause is overcome when the turning operation is performed, providing the depth of the cut taken is great enough. It must be remembered, however, that a workpiece chucked in a 3-jaw chuck is not gripped as securely as one chucked in a 4-jaw chuck.



The majority of chucked workpieces are gripped on an outside surface. However, the shape and size of some workpieces may demand that they be gripped

on an inside surface, as illustrated. In either case, the gripping faces of the jaws may be reversed to accommodate differences in workpiece shapes, or to



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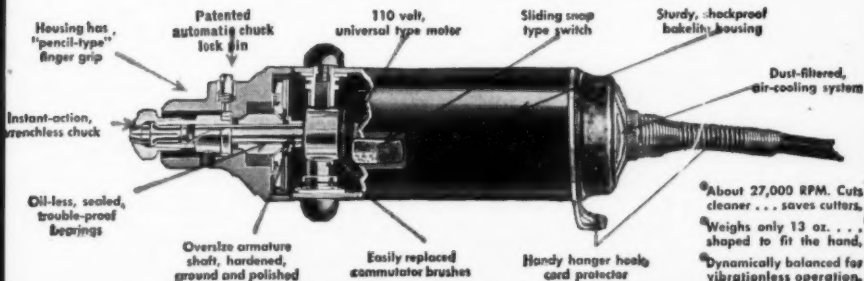
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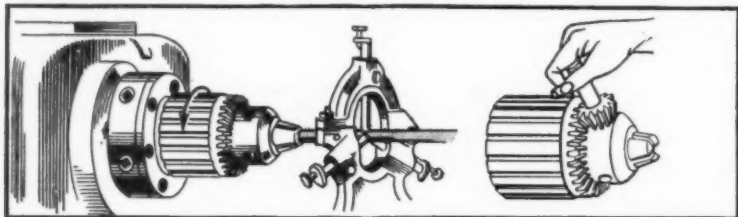


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increase the extent of jaw area in contact with the workpiece. The jaws of a 4-jaw chuck are reversible. A 3-jaw chuck is provided with a substitute set of jaws which face in the opposite direction.

There are three points that must be remembered when chucking a workpiece in a 3- or 4-jaw chuck: (1) That if the section to be gripped is hollow, it must be able to withstand the pressure of the jaws without being distorted;

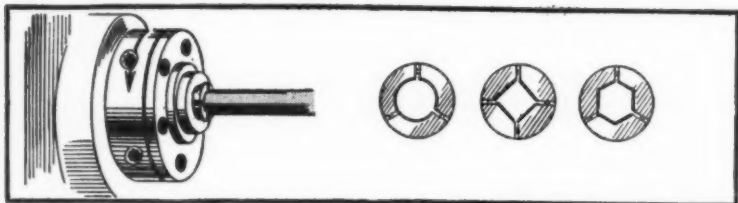
(2) that the jaws must not extend into the section that is to be worked or they will interfere with, and perhaps damage, the tool. (This can be controlled because the jaws are designed in the form of three steps, which permits the choice of any one of four gripping faces); (3) that the shape and size of the workpiece, and the operation to be performed, must be taken into account when determining the best chucking procedure.



Workpieces of small diameter that do not require extreme accuracy of setting are generally chucked in a **headstock chuck**. In principle, it is similar to a 3-jaw chuck. However, unless the workpiece is short and the section to be worked is close to the chuck, the end must be supported by a steady rest, because the gripping area of the jaws and gripping pressure are not great.

When long pieces of small diameter bar stock are chucked in this manner, they may be fed through the hollow

headstock spindle and advanced to position for another cut, as successive shapes are completed and cut off. Short pieces that are to be filed or polished may also be chucked in a similar device called a spindle chuck. Its principle difference is that it has a tapered shank which fits into the tapered spindle hole, whereas the headstock chuck is mounted on the spindle nose. One advantage of using either of these chucks for small diameter workpieces is the ease with which they are mounted and dismounted.



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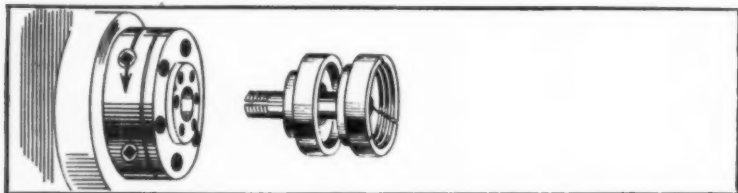
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chuck. This accuracy is due to three factors: (1) Collets are interchangeable, to fit different workpiece shapes and dimensions; (2) uniform gripping pressure is applied to the circumference of the workpiece; and (3) the entire device is made with extreme accuracy. Thus, a workpiece so chucked is mounted accurately, without adjustment.

When this method of chucking a workpiece is employed, it is important to see that all parts of the assembly are clean and free of chips, or particles

of dirt. If this is not done, a workpiece may be mounted in an off-center position to the extent of the thickness of the metal particle, or dirt, lodged between two opposing surfaces. The workpiece itself should also be clean. Long pieces of bar stock may be fed through the hollow headstock spindle, as the entire assembly, including the draw-in bar, is hollow. In this event, the part of the bar stock that projects out from the spindle should be supported to keep it from whipping.



Some workpieces, disc-like in shape—that is, greater in diameter than in “thickness” or length—such as small gear blanks, pulleys, etc., must be worked on their flat surfaces. They may be quickly chucked in a **step chuck** which provides the same on-center accuracy as the collet chuck. The capacity of the step chuck used should be only a few thousandths of an inch greater than the workpiece diameter to assure uniform gripping pressure.

Because the operations performed on the workpieces chucked in a step chuck

are generally facing, channelling, drilling, or reaming, it is necessary that the workpiece be held in a position at right angles to the lathe’s center line, as well as in an on-center position. This is assured when a step chuck is properly used, because it is constructed with a series of shoulders, against which the workpieces of varying size can be seated. In many instances, step chucks are made in special sizes for the quantity production of items of uniform diameter. Because of the speed with which accurate chucking results can be accomplished, they are very popular.

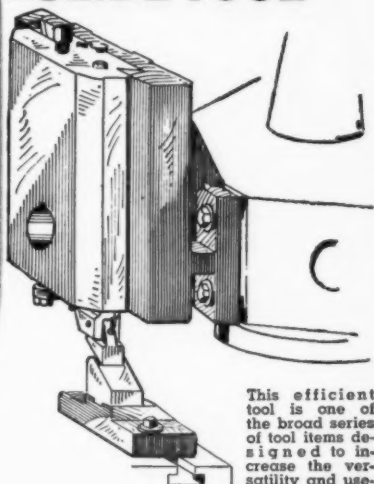
Relatively long workpieces that are chucked in 3- or 4-jaw chucks should be checked to see if they are chucked “true”; that is, to determine whether the center line of the workpiece corresponds with a line running from the chuck center to the dead center.

The so-called “chalk method” of checking a workpiece for on-center accuracy is simple, although less accurate

than mechanical methods. The workpiece is rotated slowly, and as illustrated, a piece of chalk held in a fixed

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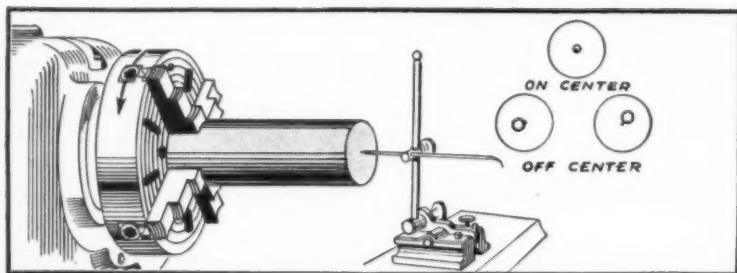




position is brought in contact with the rotating surface. If not mounted true, only the "high side" will be marked. The workpiece should then be adjusted to bring it to an on-center position. When this is accomplished, a chalk line will be drawn around the entire circumference.

The length of the line drawn on the surface of a workpiece that is out of true indicates the extent and the direction of adjustment that should be made. The shorter the line, the more the workpiece is off center, and the greater the adjustment necessary. To center it,

the point midway of the chalk line on its circumference should be moved toward center—a greater distance if the chalk mark is short, a lesser distance if the mark is long. If the workpiece is relatively short, and it is chucked in a 4-jaw chuck, it is moved by adjustment of the individual jaws. If a 3-jaw chuck is used, shims will have to be inserted between the jaw and the workpiece on the high side. If the workpiece is long and its extended end is to be adjusted, the chuck's jaws should be slightly loosened before making an adjustment, so as not to subject them to strain.



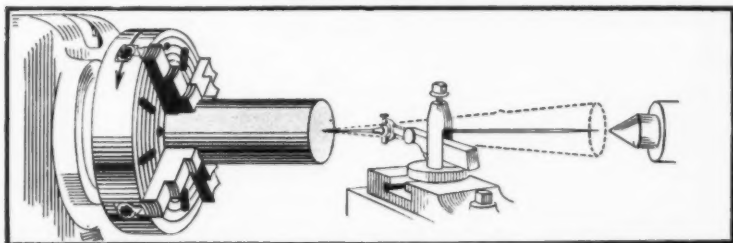
The scriber method of determining whether a workpiece is chucked accurately is efficient when a moderate degree of mounting accuracy is required. This method employs a **surface gage**. The end of the workpiece should first be faced to assure a smooth sur-

face, which is then coated with "layout fluid," or chalk, so the scriber marks will be plainly visible. The exact center must also be located and marked. The scriber point is located on this center mark, and the workpiece is rotated slowly. If it is mounted true, the point

of the scribe will remain on the center mark; if not, a circle will be scribed to one side. The location of this circle in relation to the center mark will indicate the direction it is out of true, while its size will indicate the extent. The workpiece should be moved toward center.

The scribe of a surface gage may also be used in a different manner, wherein no center mark is employed. By this method, adjustments are made to bring the point of the scribe to the same height as the lathe centers. It is then swung around so it points toward the workpiece, and is brought in contact with the end surface, close to the actual

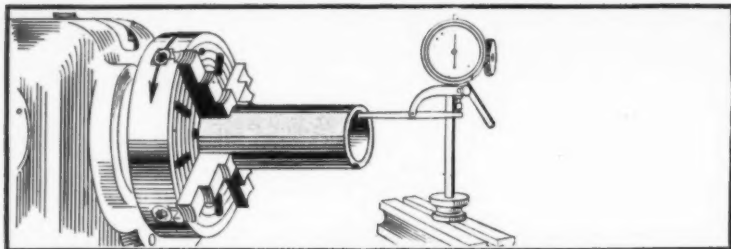
center. In this position, the workpiece is rotated. This action will cause the scribe to scratch a circle on the workpiece surface. The dead center is then brought in contact with the workpiece end surface, and the location of its point in relation to the circle will indicate whether or not the workpiece is mounted true. If mounted true, the dead center will point to the center of the scribed circle. If not, it will point to one side of this circle, indicating the extent and direction in which the workpiece should be adjusted. Either of the procedures described should be repeated until a true setting is accomplished.



The wiggler method is comparatively simple and accurate. The entire assembly is made up of a holder supporting a universal joint, which acts as a fulcrum for a long, pointed bar called a wiggler. This fulcrum is located close to one end of the wiggler; thus, any movement of the end projecting a short distance from the fulcrum will be greatly exaggerated at the other end. The holder is mounted in the tool-post, and the short arm of the wiggler is inserted in a hole punched in the exact center of the workpiece end surface. Then the workpiece is rotated. If it is not chucked true, the long arm of the wiggler will describe a circle, and the setting must be adjusted until the wiggler point remains in a stationary position opposite the dead center.

In order to determine the direction

in which the workpiece should be moved, the tool-post should be adjusted so the circle described by the wiggler will be uniformly around the point of the dead center, as illustrated. The lathe is then stopped, and the workpiece is moved to bring the end of the wiggler opposite the point of the dead center. It should be remembered, however, that because the wiggler is pivoted on a universal joint, the workpiece must be moved in a direction opposite that in which the point of the wiggler is off the dead center. Each adjustment should be checked, and this procedure should be repeated until the long end of the wiggler remains in a fixed position opposite the point of the dead center. For absolute accuracy, both the wiggler and the dead center should be ground to a fine point so even minute variations in alignment may be discernible.



A dial indicator makes possible the maximum accuracy in checking the on-center position of a workpiece. This is the case because any variation from center is visibly recorded in graduations as fine as thousandths of an inch. Briefly, the procedure followed is this: First, adjust the center point of the indicator on the workpiece so it is subjected to sufficient pressure to cause the hand on the dial to make one complete revolution. Second, adjust the face of the dial so the zero mark is opposite the hand. Third, rotate the workpiece by hand and determine the extent to which it is out of true. Fourth, stop the workpiece at the point of highest dial reading, then move it in a direction from this point toward its center. The extent of workpiece adjustment is half the maximum distance the hand moves from zero.

Different methods are employed to bring a dial indicator to the correct position on the workpiece surface to get a

reading. In the accompanying illustration, a reading is being taken on an interior surface, which is something that cannot be done by any of the methods described above. In the type of holder shown, any variation in off-center setting is transmitted to the dial indicator mechanism through a lever. It will be seen that this construction permits the checking of either an interior or exterior surface with equal ease.

Other holding devices employ an arm, leading from a securely clamped base. This holds the dial in a position that will allow the contact point to be brought to position on the workpiece surface. Sometimes this base is clamped to a fixed part of the lathe, and, in other instances, it is securely held by the tool-holder.

It should be remembered that a dial indicator is a very delicate instrument and if its accuracy is to be preserved, it must be handled with care.

Some workpieces should be turned between centers, either because of their length, their proportionate dimensions, the nature of the operation, or, because they must be turned end for end or transferred to other machines for subsequent operations.

There are many advantages to mounting a workpiece between centers, if its size or dimensions, and the nature of the operation to be performed, will permit. For instance, the center holes

drilled in both ends of the workpiece locate the position of a fixed axis around which the workpiece rotates when mounted on the live and dead centers. Because these center holes and the ends

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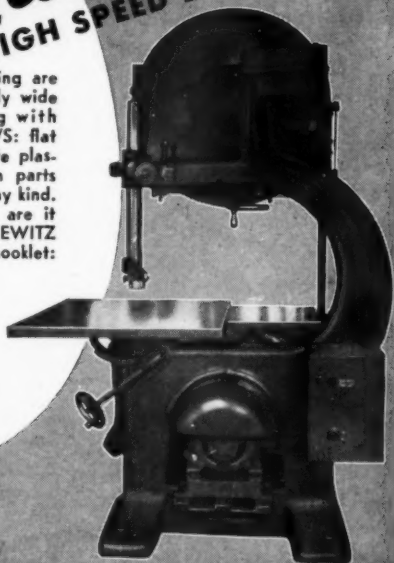


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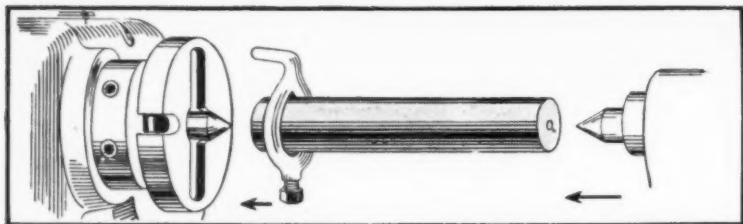
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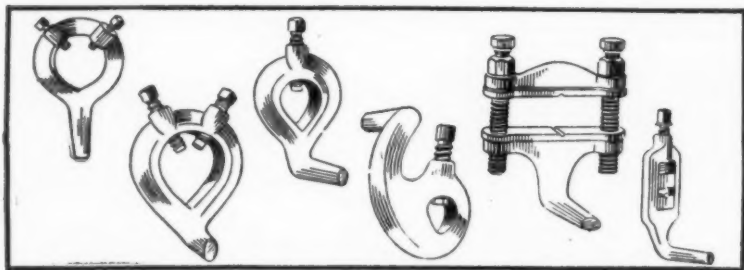
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of the centers are both tapered at the same angle (60°), the act of bringing the centers into position in the center holes automatically brings the workpiece into on-center position each time. Thus, if a workpiece is turned end for end, or transferred to other machines for subsequent operations, all cuts are in correct relationship to the established center line.

When mounting a job between centers, it is important that the centers be securely seated in the center holes. Sometimes, when the workpiece is heavy, this is not done. In this event, the pressure of the tool when cutting toward the headstock will bring the

workpiece to a proper seating position on the live center, permitting it to ride loose on the dead center. When cutting toward the tailstock, just the opposite takes place. In either case, accurate cutting results are not possible. Another point that should be borne in mind is that the amount of friction and heat normally created by the non-rotating dead center is increased when the cut is taken toward the tailstock, and it is then particularly important that the dead center be kept well lubricated. The pressure of cutting also tends to cause a relatively long workpiece of small diameter to bend away from the tool. Under such circumstances, a follow rest or steady rest should be employed.



The shape and size of the workpiece should be taken into account when selecting a dog. If it has a flat surface at the end to be gripped, a dog with a square opening is used; if cylindrical, it is best to use a dog with a round or heart-shaped opening only slightly

larger than the diameter of the workpiece. However, if the dog is of the bent tail variety, it must be big enough to permit its tail to ride free in the slot of the driving plate. If the tail binds, the workpiece is pulled to one side of the live center, as illustrated below. As

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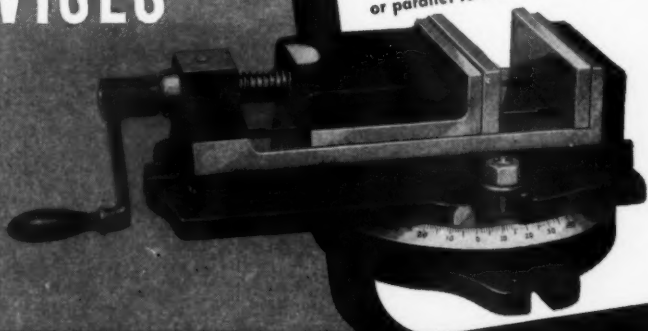
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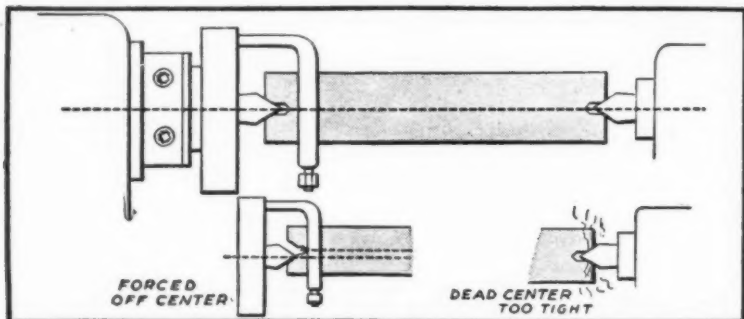
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a result, it will be thrown off center, and the tool will cut to a varying depth.

For small diameter workpieces, the dog illustrated at the extreme right is often preferred. Its gripping surfaces are cut like a threading die, and it will, therefore, grip securely. However, it may mar the workpiece surface. A straight-tailed dog, illustrated at the left, has one advantage: It can be used with any size driving plate without the possibility of the workpiece being pulled off center. However, it requires the use

of a bolt or driving stud, which is attached to the driving plate. Dogs with exposed set screws present a hazard to the operator, especially when filing or performing some operation that brings his arm close to the rotating dog. To avoid this danger, some dogs are constructed so that, when rotating, the tail precedes the set screw, while others have set screws that are flush when screwed to position. In all cases, a dog should be located as close to the end of the workpiece as is practical, and should be securely clamped.



The purpose of this illustration is to clarify the difference between correct and incorrect mounting between centers. The upper diagram shows that is meant by correct mounting. In it the center line, or axis of rotation, is parallel to the sides of the cylindrical workpiece, and an equal distance from all points on its circumference. This is assured when the centers are securely seated in accurately located center holes, and the tail of the dog is not binding in the driving plate slot. One lower illustration shows how a dog that pulls the workpiece to one side establishes an incorrect center line, the other shows where excessive friction and heat are created when the dead center is too tight.

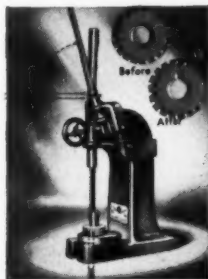
It is also necessary to see that a workpiece is not mounted loosely between centers. In this event, it will tend to back away, or "ride up" on the tool. This may result in tool breakage, in extreme cases, or in irregular surface finish if only slightly loose. Further, although a workpiece may be mounted with the correct dead center tension before a cutting operation is started, it is often necessary to relieve the tension during the cutting operation, because of the expansion of the workpiece, due to heat created by the cutting process. This is especially true if a heavy cut is being taken. Under these circumstances, if the tension is not reduced, the dead center may be damaged, or the center hole galled. Remember that the

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**The du MONT
CORPORATION**

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dead center does not rotate and is, therefore, subject to constant friction. As previously stated, the dead center should be kept well lubricated at all times with a mixture of either white or red lead and lubricating oil.

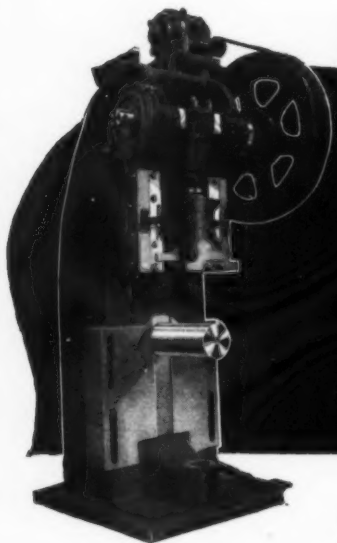
REID PHASE CONVERTER

This unit is designed to give standard voltages in sections where only 110 volt, single phase, current is available. It changes 110 volt single phase, current to 220 volt, 3 phase current, and drives any

machine or machines up to $1\frac{1}{2}$ hp capacity. The phase converter is useful in small shops, since it eliminates the necessity of installing a higher voltage line.

The converter measures 12" high, 22" long, 15" wide, and is completely encased in a sheet steel cover, except for switches. It is of rugged construction and the manufacturers claim it will give long trouble-free service, as there is only one moving part that requires occasional lubrication.

The Reid Phase Converter is the product of the Reid Brothers Company, Inc., Beverly, Massachusetts, manufacturers of precision Surface Grinders.



THOMAS

HORNING PRESSES

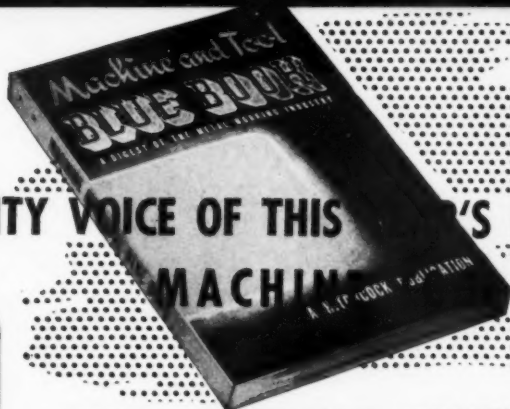
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5105



BUFFALO FORGE ADOPTS FIRM PRICE POLICY

Buffalo Forge Company, 465 Broadway, Buffalo 4, N. Y., and its subsidiary, Buffalo Pumps, Inc. announce, effective April 11th, firm prices on all lines of fans and blowers, power plant equipment, air conditioning equipment, unit heaters and pumps.

Mr. Edgar F. Wendt, President of Buffalo Forge Company, issued the following statement:

"After considerable deliberation we have decided that the best interests of the country will be served by a return to normal pricing procedure. While we have no similar assurance that our costs of labor and purchased materials may not be subject to increase, it is our hope that spiraling of prices will not continue. The American public is fundamentally interested in preserving and further developing the high standard of living which we enjoy. By stabilizing prices of our equipment which goes into all branches of American industry we hope in a small way to assist in restoring normalcy.

"For several years, due to uncertainty of future costs, industry has been quoting prices subject to increases up to the time of shipment, months or years ahead depending on shipping schedule. These prices have mounted and mounted because of steadily increasing costs. Such uncertainties is eliminated by the firm price policy.

"During the war years, American industry produced the equipment required at a phenomenal rate. Today, with the hope of permanent peace before us, with a world looking to America for leadership, with the mechanical ability which we possess it would be shameful if we failed to recognize our responsibilities.

"There is no doubt that we have a period of adjustment ahead. We merely hope to assist in shortening this period."

Buffalo Forge Company has a remarkable record of war production, having supplied axial flow fans for combat ships of the U. S. Navy, has built an enormous amount of fan and air-conditioning equipment for war industries, and claims the honor of being the first fan builder to be awarded the Army-Navy "E" for exceptional production.

"The most successful man is the man who holds onto the old just as long as it is good, and grabs the new just as soon as it is better."

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Handee is the original, single hand controlled, electrically driven tool — and it's the finest today. It can be used at the bench or carried right to the job. It reaches hard-to-get-at places on machinery, touches up perishable tools, grinds dies, chip breakers on broaches, removes burrs, etc. Runs at a cool 25,000 r.p.m. AC or DC. Wt. 12 oz.

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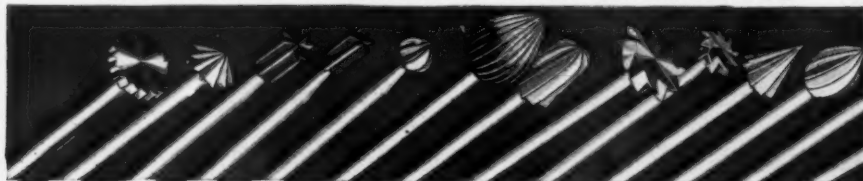


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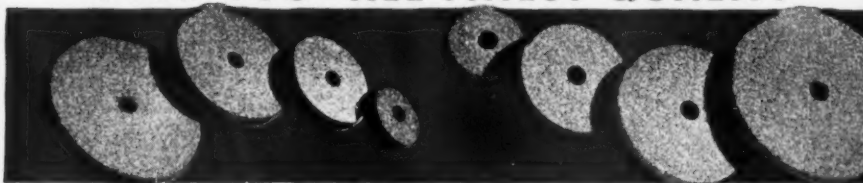
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BEARING CAP SETS BROACHED EN BLOC

This American Duplex Surface Broaching Machine is tooled up to broach automotive main bearing caps, producing complete sets for 100 motors per hour.

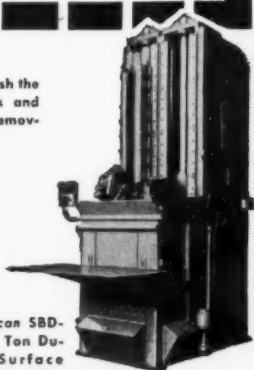
When you are planning metal shaping or finishing work, make use of American's complete broaching service—machines, tools, and engineering. You are under no obligation when you SEE American FIRST!



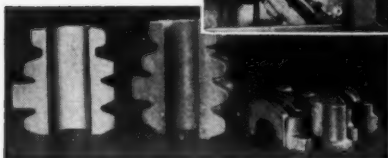
Operation at right straddle broaches the two ends of the casting.



Operation at the left is to finish the joint face and bearing lock and semi-finish the half round, removing $\frac{1}{8}$ stock on each surface.



American SBD-66-25 Ton Duplex Surface Broaching Machine with tilting type work tables.



Above: Right to left: 1. The rough casting. 2. Ends straddle broached. 3. Joint face, bearing lock and half round broached.

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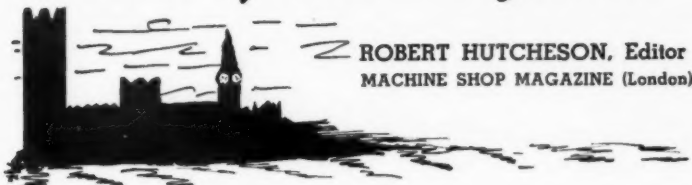


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For years Ex-Cell-O has been known by American industry as headquarters for precision-made bushings . . . Ex-Cell-O carries one of the largest and most varied stocks of drill jig bushings available in the world. Stocks are carried in Detroit, New York and Los Angeles.

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Letter from England



ROBERT HUTCHESON, Editor
MACHINE SHOP MAGAZINE (London)

Earnest attempts are being made to revive clock and watch making in this country. Many years ago Britain was famous for clocks and watches, and much of the work was done in the Coventry area which district is now equally well-known for its motor car industry. The latest step is the opening of a new factory in the Swansea area of Wales by the Anglo-Celtic Watch Co. Opening of this new factory, which is the first of three, is due to the cooperation of Smiths English Clocks Ltd., Vickers Armstrongs Ltd., and Ingersoll Ltd.

* * *

In July the works of the well-known aircraft firm A.V. Roe will shut down at Newton Heath, Manchester and most of the workers (numbering about 1,000) will go to the firm's works at Chadderton which is near Manchester.

* * *

News of the death of Mr. Henry Ford was heard with great sorrow in this country and the daily papers have carried long articles on his career, for Ford's methods of production have long been regarded with interest by British engineers.

So far as the British Ford Motor Company is concerned the death of Mr. Ford has had no immediate effect on the price of its shares. Dealers had wondered whether any holding of Mr. Ford's in the British company would be placed on the market but at the time of writing there is no information available on this matter. In point of fact the shares are standing at a slightly increased price due to a hope that the dividend to be declared in a few weeks time will be 10 per cent, or even more, as against the previous dividend of 7½ per cent.

* * *

A plant for the extraction of various chemicals from petrol-eum is to be erected at Thornton-le-Moors in Cheshire and work has just begun on preparing the site which covers 85 acres. This is a project of the Shell Group and a model of the plant

will be on view at the London section of the British Industries Fair in May. The chemicals obtained will be available for a wide range of industries, e.g. paints, textiles and rubber, and it is anticipated that a new source of chemical solvents, etc., will be made available to overseas buyers when the plant comes into operation.

* * *

Timber, and especially well-seasoned timber, has been in short supply for a long time. Wood is being cut out of house construction as much as possible, and in many instances saving of timber calls for much ingenuity as it is not possible to use constructional steel in its place since steel also is in short supply. Negotiations are in hand for the purchase of timber from abroad and one possible source is Chile. The Government has instituted a system of priorities for the allocation of timber so that high on the list of timber users come coal-mines, gas and electrical undertakings, coal-oil converting plants, transport equipment concerns, the timber being granted for vital repair work.

* * *

A mission is due to arrive here in a few weeks time from Uruguay to discuss trade agreements which will cover, among other things, imports into that country of British machinery.

* * *

The development and use of special heat resisting alloys is one of the factors that contributed to the establishment of the world's speed record (616 m.p.h.) by a jet propelled Gloster fighter.

The "Nimonic" series of alloys (nickel-chromium) were developed during the war. Nimonic 80, used for gas turbine blades, was introduced in 1941 and has been the standard blade material, while Nimonic 75 has been used for other parts, e. g. flame tubes where working temperatures average 1,000 deg. C.



Accurately bored casting having long pinion bearing features this new midget arbor press. Simple but sturdy construction permits heavy use. Can be used on several assembling operations. Also applied to cut-off of light metals and plastics. Has provision for adaptation for special work. Can be furnished with return spring and adjustable stop screw.

TABLE OF SPECIFICATIONS

Clearance of spindle.....	3"
Clearance to column.....	1 1/8"
Diameter of work.....	2 1/4"
Size of pad.....	2 x 1 3/4"
Length of stroke.....	1-13/16"

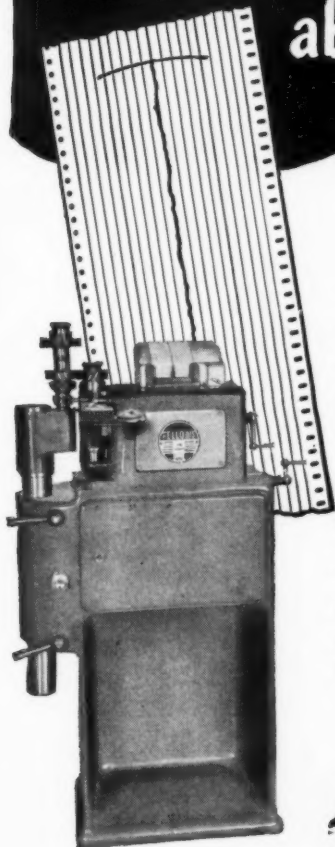
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201

While the gas turbine has been developed so far only for aircraft use the ultimate possibilities are far wider. Much depends upon the ability of the metallurgist to develop alloys which will give turbine blades a minimum life of 10,000 hours, instead of the few hundred hours that have been acceptable for fighter aircraft.

* * *

Ventilating and air-conditioning equipment is being exported and figures show about a twenty-five per cent increase on the pre-war exports.

Delivery periods are up to one year, depending upon the size and weight of the particular equipment, and the demand seems to be coming from all over the world.

* * *

Production in the motor-car industry fell during February to 9,921 cars as against 25,005 cars produced in January and 26,827 produced during December according to the last issue of the Monthly Digest of Statistics which gives the export figures as 4,600 in February and 11,475 in January. This decline in February was due to the fuel crisis and is to be found in other industries. Commercial vehicle production fell from 13,159 in January to 5,792 in February.

* * *

A scheme of Engineering Centres has been inaugurated and the first of these is scheduled to open in Glasgow in a few months' time. These Centres will be permanent exhibitions where engineering equipment can be viewed without there being any attempt made to persuade the visitor to buy. Salesmanship will be absent. A good advisory service is contemplated so that anyone interested can inspect a machine and receive sound advice on his problems without any attempt being made to sell the machine to him. The Centres will be in touch with research bodies, Government departments, engi-

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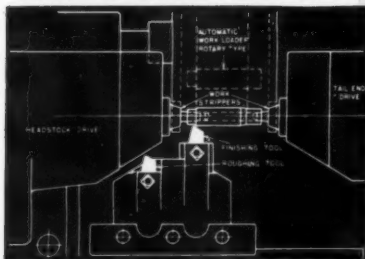
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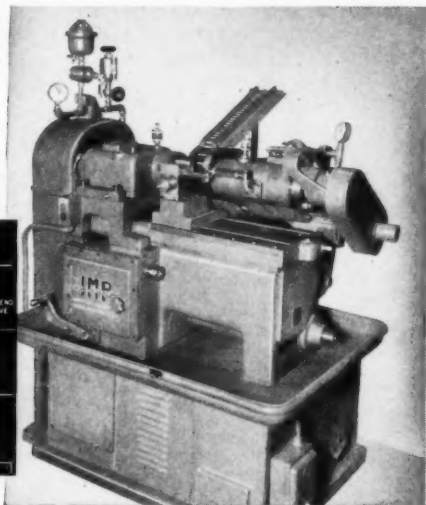
MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

COST ON VALVE GUIDE JOB REDUCED 73.6%



Tooling layout for turning Valve Guides on Lathe illustrated at right.



Problem: To reduce cost of rough and finish turning valve guides.

Solution: The Lo-swing IMP Automatic Lathe was selected for this job and fitted with a new type Rotary loader and a complete new adaptation of tooling. This lathe is equipped with special revolving head and tailstock spindles and the advantage of this double-end drive is two-fold: 1—Since the piece is driven from both ends much coarser carriage feeds are possible, thereby considerably increasing production; and 2—inasmuch as both spindles are driven, there is no wear on the revolving centers.

The machine is entirely automatic. Valve guides which have been previously bored to size are placed in a loading chute and fed by gravity into openings in the Rotary loader. The loader indexes the pieces to the proper position where they are automatically picked up by the continuously revolving spindles of both heads.

The OD is rough and finish turned in the same operation with two separate carbide tools, each having its individual feed. The finish turning tool begins cutting after the roughing tool has been relieved from the work, thereby assuring close concentricity between the bore and the finished diameter.

On high production jobs operator fatigue is an important item . . . automatic work handling permits full mechanical efficiency of equipment and reduces accident hazard.

The Rotary type loader assures complete control over the fast revolving pieces eliminating danger to the operator and damage to the pieces which are completely stationary by the time they reach the discharge chute.

One operator attends two of these IMP Lathes and produces 73.6% more work per hour than was produced on the former single machine with hand loading. If your per piece costs are too high, maybe Seneca Falls can help you.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

neering societies and other bodies in order that they may be able to give up-to-date consultative assistance.

* * *

High costs in the ship building industry may be the cause of loss of orders by Scottish yards is the view of several shipbuilders north of the Border. Among the contributing factors alleged by shipbuilders are: a go-slow policy on the part of some of the men, an uneconomic 44-hour, 5-day week; delays caused by shortages of steel and timber, and the migration of skilled men from some of the yards. All these conditions make it difficult, if not impossible, to quote a firm price for a large ship as there is no way of ascertaining how costs will increase during the period of building.

* * *

A scheme for the training of registered disabled men for employment in the Electrical Contracting Industry has been agreed by the Ministry of Labour and National Service in consultation with the National Joint Industrial Council for the industry under the provisions of the Government's Vocational Training Scheme.

The scheme is intended to produce a journeyman electrician with a full range of craft knowledge, including the rudiments

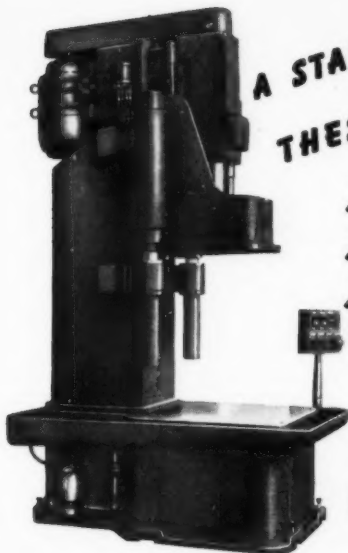
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The Robbins No. 3 DRILLMATIC is designed and built as a STANDARD MACHINE specifically for special purpose drilling, reaming, tapping and boring operations at lower cost. Drill heads with any number of spindles are easily mounted on the tooling saddle and by use of auxiliary units around a special base, multiple operations may be performed vertically, horizontally or any angle in between. When operations are changed, the No. 3 Drillmatic can be economically converted to the new job.

Old-type soft ways are replaced by large diameter guide bars in the saddle. These bars slide in guide bushings on the oversize machine column. Both the bars and bushings are hardened and ground alloy steel . . . automatically lubricated. The saddle is actuated by a sturdy hydraulic ram directly over the work, reducing friction on the guide bars and further contributing to the life-time wearing qualities of both the bars and bushings.

The hydraulic power is contained in a compact unit which is stationary at the top of the machine column . . . no outside piping or valves and all connections are manifolded inside the unit . . . no leaks. Two separate adjustable feed rates are supplied and a wide variety of speeds is obtainable by using change gears within the unit or by changing V-belt pulleys.

Send for illustrated catalog which details the many "plus" features of construction and operation. Study them over; then consult with Robbins engineers on the applications in your plant. Robbins is qualified to design and build the tooling for your entire job . . . tooling that will do the job faster, better, more economically. Robbins Engineering Company, 318 Midland Avenue, Detroit 3, Michigan.

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of cable jointing and armature winding. Training will be provided in two parts: the first in Government Training Centres and the second in Employers' Establishments. The period of training in each part is for 39 weeks and trainees must undergo a "passing-out" test before proceeding to the second part of their training.

Selection of trainees will be made in accordance with certain standards of suitability which have been agreed with the National Joint Industrial Council for the industry. Regional Advisory Committees composed of representatives of each side of the industry have been nominated to advise on the suitability of employers to provide the requisite training during the second part of the training period and, when necessary, on the suitability of applicants for training.

At present, the number of new entrants to be trained under this scheme is not large and will be limited to men registered under the Disabled Persons (Employment) Act. The operation of the scheme and the numbers to be trained will be kept under review by the Ministry and the National Joint Industrial Council for the industry.

During the period of training at a Government Training Centre, the trainee will receive the standard training allowances. Wages, at agreed rates, will be paid by the employer during continued training. After the full period of training, wages at the full minimum rate will be payable.

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Precise Products Co. of Racine, Wis., are ready to supply anyone who is interested with a copy of a 6-page folder on the Precise 40, a lightweight electric handtool and portable grinder.

The tool is built for high speed precision work on most industrial materials and can be used as a hand tool or mounted in stand, vise, lathe or milling machine.

Diagrams show the ways in which the tool may be operated, and specifications and applications are completely described.

The Precise 40 may also be obtained in complete sets, and photographs are included in the folder showing the sets.

Folder may be secured from Dept. BB, Precise Products Co., 1328-30 Clark St., Racine, Wis.

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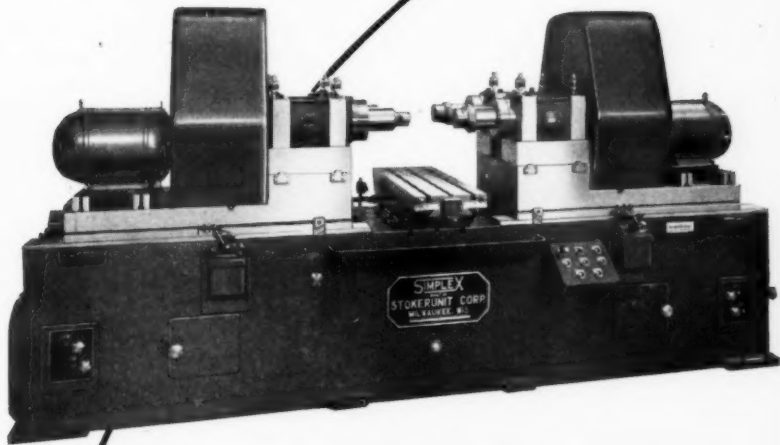


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Increasing wage rates of today make necessary new methods of reducing costs. At medium production rates, this becomes difficult with general purpose machine tools. Simple multiple tooling and fixtures, indexing from roughing to finishing position, offer a new cost reduction method. Tooling costs are low — job possibilities endless.



This photograph shows a SIMPLEX 4U 2-way Precision Boring Machine equipped with four #4 spindles and a hydraulically indexed sliding table operating between adjustable positive stops. On the sliding base a single work holding fixture is mounted providing for operating on the work from both ends. After the roughing operation is completed on both ends, the table is indexed to the

finishing position, the finishing operations are performed on both ends simultaneously and the completed job is ready to remove from the fixture to change to the next job. The fixture and tools are removed and retained intact, ready for a quick set-up when the job is again run. The automatic cycle relieves the operator and helps maintain predetermined production schedules.

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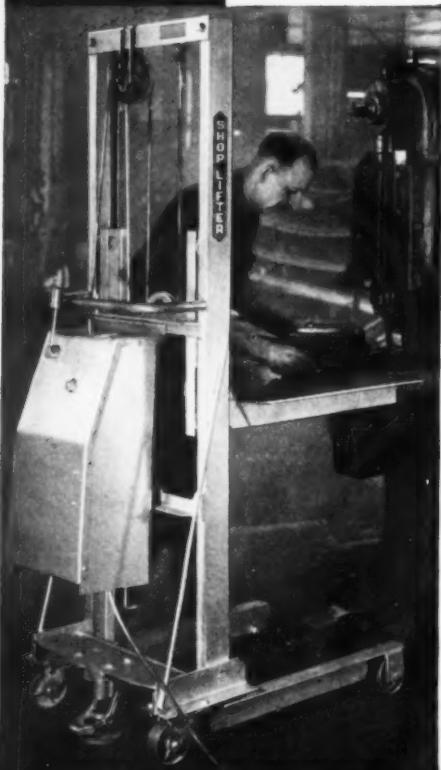
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Platform—steel plate, 24" x 24". Overall height—6'0". Platform lift—4'6".

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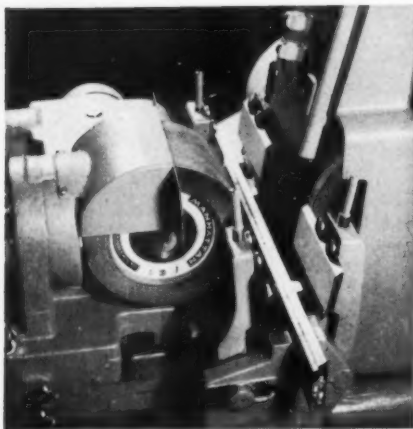
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Using Carbides in Metalworking



by
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*Consulting
Engineer*

The milling of flats on overarms as used in milling machines presents an interesting example of a semi-steel component milled with carbide on a machine that is standard in every respect. The installation (Fig. 1) is a 15 horse power vertical knee type machine. It is of a design prior to the advent of carbide and carbide milling technique

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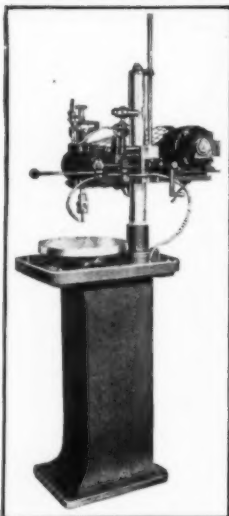
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and does not possess a built-in flywheel, electrical brakes, separate table motor drive and other features usually considered necessary for best results with carbides.

The material in this special type of overarm is so-called semi-steel; hence it classifies itself immediately for the planning engineer. The ten classes of materials for identification purposes are:

- (1) Wrought Iron
- (2) Low Carbon Steel
- (3) Stainless Steel
- (4) Standard SAE Classifications beginning around SAE 1015 or 1020.
- (5) Cast Steel
- (6) Cast Iron—unmodified and uncontrolled
- (7) Cast Iron—Modified and semi-steel or controlled as Meehanite, Linite, etc.
- (8) Cast Iron—special as white iron, chilled,
- (9) Malleable
- (10) Non-ferrous materials such as Aluminum, Magnesium, etc.

The SFM rates for these classes are:

- (1) —1,000 feet per minute
- (2) —600- to 900
- (3) —900

(4) BRINELL HARDNESS	SFM
160—180	624—593
180—220	593—536
220—300	536—447
300—420	447—338

- (5) —300
- (6) —300 to 450
- (7) —300 and lower (Brinell from 180 to 250)
- (8) —100 to 250 Brinell from 500 to 700
- (9) —350 to 450
- (10) Highest available; have been milled successfully in production at rates over 20,000 surface feet per minute.

This table of rates is the all-important starting point for good carbide milling results. Unless the SFM rate is set on the basis of, first, classifying the ma-

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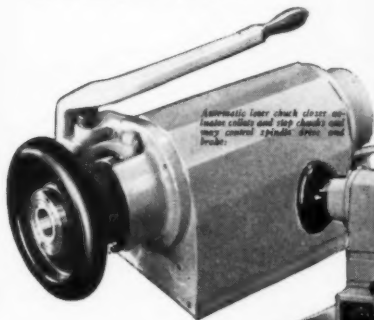
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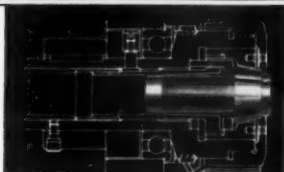


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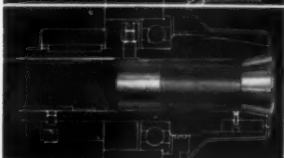
every job. Then it really pays with lowered time on every piece. How?—With the right spindle speed for efficient tooling, with quick means for chucking work, with properly grouped control levers and by reducing operator fatigue.

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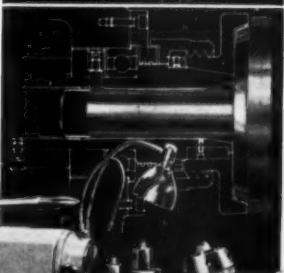
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terial, then specifying the SFM rate in terms of its classification, the planning for this job is likely to turn out disastrously. The type, kind, size, design of the milling machine, milling cutter and the nature and construction of the workpiece have nothing whatsoever to do with the specification of the surface speed. It is important, therefore, that the SFM designation be made on the basis of a clear understanding of the nature of the material to be machined. It is important that cast steel and forged or rolled steel be kept distinctly separate: the former requires a surface rate of not more than 300 while the latter may go as high as 900. It is likewise essential to separate the various types of cast irons. The three divisions included in the above tabulation list all the various kinds of irons used in manufacturing.

These classifications of irons affect not only the choice of SFM rates but the cutting and clearance angles as well. Also, the separation of the various kinds of steels, one from another, controls the selection of the surface speed and also the specification of clearance angles. The latter is a critical factor in

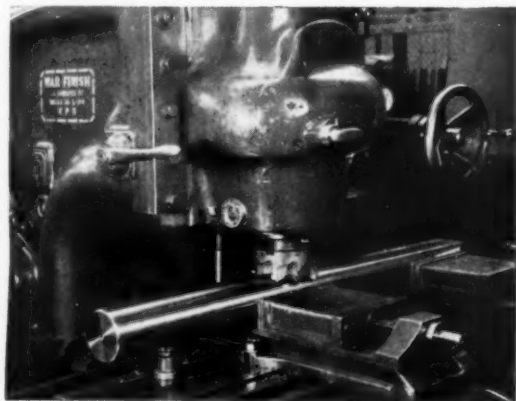
the carbide milling of these materials including the commonly used "boiler-plate" (a low carbon material). Unless a large face clearance angle is specified failure will result.

To return to the job in hand and proceed with its analysis: since it is of semi-steel, and Brinells in the neighborhood of 200, the surface foot rate should be specified as 300. Because of nearest dial reading variation, the reading will be taken on the low side rather than on the high.

The SFM rate, therefore, for this operation is set tentatively at 300.

The cutter will be 6" to mill a flat on this component approximately 3" wide. This 6" cutter has 8 teeth, carbide tipped. The cutting angles are shown in Table 2 under, "Modified Cast Iron," namely, 7 degrees negative radial rake, 7 degrees negative axial rake and these with a 15 degree nose angle result in a true rake of approximately 7 degrees negative. The important factor here is the "true rake" angle which can be made up by any number of combinations of radial and axial angles in conjunction with the nose angle. Experts generally agree that a negative angle

Fig. 1: The 15 horse power, vertical knee type milling machine used to mill a flat on an overarm to mill a milling machine.



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MATERIAL	CUTTING ANGLES	CLEARANCE ANGLES
Wrought iron	10 PRR—7 NAR 8 PTR	7 OD—9 Dish 15 Face Cl
Low Carbon Steel	10 PRR—7 NAR 8 PTR	7 OD—9 Dish 15 Face Cl
Stainless Steel	10 PRR—7 NAR 8 PTR	7 OD—9 Dish 15 Face Cl
Standard Steel	7 NRR—7 NAR 7 NTR	7 OD—9 Dish 7 Face Cl
Standard Cast Iron	10 PRR—7 NAR 8 PTR	7 OD—9 Dish 7 Face Cl
Modified Cast Iron	7 NRR—7 NAR 7 NTR	7 OD—9 Dish 7 Face Cl
All ferrous material harder than 300 BHN	10 NRR—7 NAR 8 NTR	5 OD—9 Dish 5 Face Cl
Non-ferrous materials	15 PRR—7 NAR 12 PTR	7 OD—9 Dish 15 Face Cl

NOTE:

PTR—Positive True Rake
NAR—Negative Axial Rake

NRR—Negative Radial Rake
PRR—Positive Radial Rake

NTR Negative True Rake
OD—Outside Diameter, or Peripheral
Clearance
FR—Face Relief, or Clearance
FCE—Face Cutting Edge, or Dish

Table 2

• • •

ranging from 7 to 10 degrees, true rake, is necessary for the harder materials which Brinell over 180, whether they be tagged as steel or iron. The possible exception is chilled or white iron that Brinells over 500; here the angle speci-

fication is around 10 degrees negative true rake. The reasoning behind the specification of negative angles for the harder materials is simply and easily understood: the use of a negative angle at the cutting edge puts more than 90

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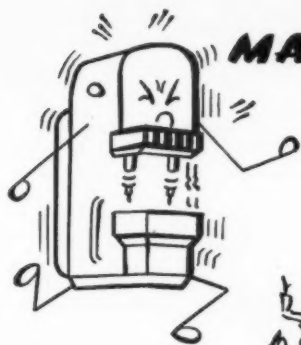
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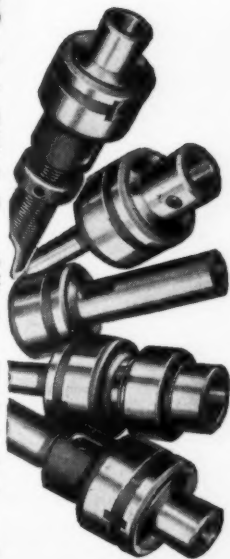
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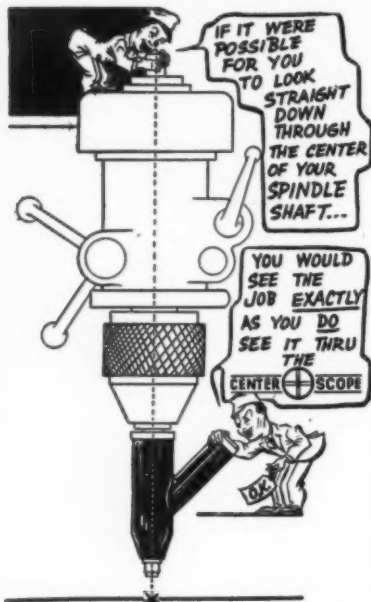


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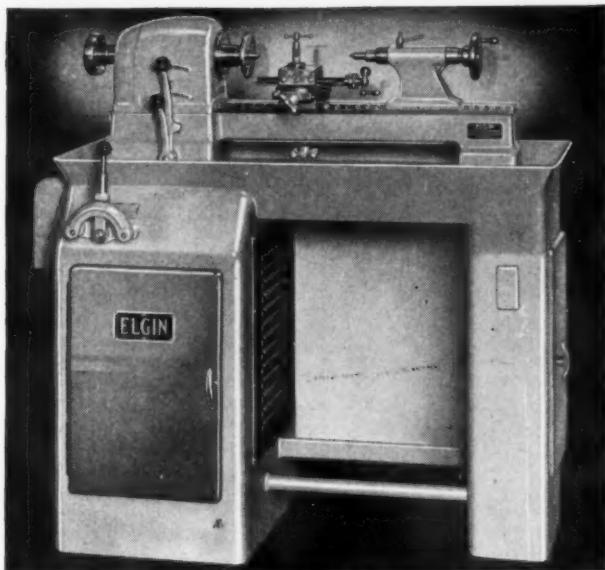
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degrees of carbide at that critical point and, in addition, the cutting forces are directed, because of the negative angles, in a manner to place the carbide in compression. Since carbide is the strongest known material in compression, the outstanding length of life in the face of high speeds against the hardest materials is the result. If the angles are positive, as when milling the less hard materials (under 180), then the cutting forces act to place the carbide cutting tip and material in tension. This is entirely satisfactory for the materials whose strength is not in the upper brackets, yet it must not be forgotten that carbide is not considered a suitable material when placed in tension. The positive cutting angles are specified, whenever possible, since it is assumed they cut more freely and with less power required than the negative angles. In the latest technique where the negative cutting angle is ground into the blade only for a distance equal to the chip thickness, plus its increased thickness due to the compressibility, which is usually about 50%, the negative cutting angles give evidence of removing metal with the same freedom and ease and force as the long-used positive angles.

The grade of carbide for this semi-steel material, under discussion in this article, is about half way between the cast iron and the steel cutting grades, just as the material it is cutting is half way between cast iron and steel. The grade selected for these operations has greater strength than the customary straight Tungsten Carbide grades and less of the wear resistance that characterizes these sintered materials.

The next step in this analysis is the determination of the metal removal rate, considering the workpiece only. If it were not a solid bar of semi-steel, but a cored member with thin walls, then the determination of this removal



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rate must begin with the workpiece. For, it must be kept in mind that the limitations in the art of metal removal are no longer in the cutting material but now only in the workpiece and the machine. It need not be in the latter, theoretically at all, since the machine tool builder is capable of constructing any required size spindle, within reason. A 100 horse power spindle has been put on paper and was considered feasible; 50 horse power spindles are being built regularly into standard (for carbide machining) machines. Multiple spindle machines are being built with totals as high as 200 horse power but in each of whose spindles no more than 50 horse power is being made available. There will come a day when the only reasonable limitation, in a milling set-up, will reside solely in the workpiece. For our present purposes, considering equipment designed for the older techniques, it is necessary to consider the machine limitations.

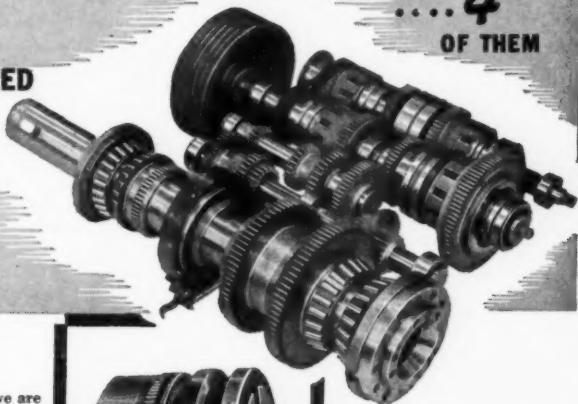
In the component before us there are no visible limitations. It can be machined at any carbide rate without distortion or vibration. The 15 horse power knee type machine designated for this operation must be considered the factor that will determine the removal rate. In this machine and on this job the K factor is .5.

This means that 30 cubic inches of the semi steel can be converted into chips each minute and since the cross sectional area is 3 by an average depth of .300" or .9 square inches, the feed rate can be quickly established. If the total metal that can be removed each minute is divided by the area of the cut then the result is the feed rate in inches per minute. Here the 30 is divided by .9 or approximately 34 inches per minute. The nearest reading on the dial to this calculated feed is 30 ipm. The corrected removal rate then is 27 cubic inches per minute.

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The chip load should now be checked; this depends on the number of teeth and the rpm. The 8 bladed cutter will revolve, as indicated previously, at 400 rpm to yield a surface foot rate of 600 feet per minute. The chip or tooth load is now calculated as follows: 30 divided by 8 divided by 400 or approximately .009". This is a satisfactory load per tooth and yet it were better practice to operate this job at twice that Chip Load. The cutter life would be better and the operation of the machine would leave little to be desired. Cutter life is dependent, obviously, almost entirely on the number of tooth contacts with the workpiece. If in this operation of milling the flat on this cylinder the chip load is .018" instead of .009" then the tooth contacts are halved and the cutter life, other factors being satisfactory, is doubled. This law operates until the increased tooth loads set up vibrations in the set-up that will cause early or at

least earlier carbide tip break-down. The same law holds for increased depth of cut which does not affect the cutter life until such increase is effected at the expense of rigidity and solidity of the combination of cutter, workpiece and machine. Obviously, as the depth (of the cut or tooth load) increases the pressures to remove that additional metal rises until these greater forces are reflected in distortions and vibrations.

The method of milling should always be specified as part of an analysis. In peripheral milling, as in slotting, it should be in terms of "climb" or "conventional"; in face milling in terms of placing the cutter on the "bias" that is, setting its center line away from the center line of the workpiece. This latter is done for the present operation. The cutter center line is specified as being offset from the center line of the cylinder by bringing it closer to the observer.



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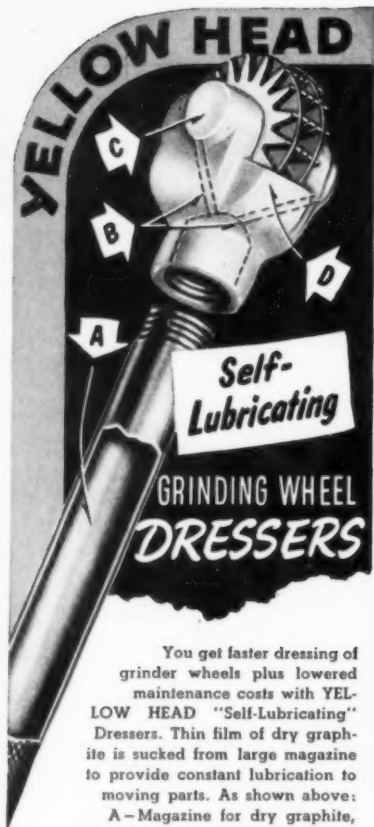
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This results in (1) the tooth entrance angle being favorable and the carbide blades taking a bigger chip thickness at the entrance of the tooth into the work than otherwise; and (2) by using a right hand cutter, with this specification of set-up, the cutting forces are directed against the column face of the machine instead of away from it and will be absorbed with out distress in the machine, the workpiece, the cutter or the spindle. Consideration of cutting forces and their proper direction must be emphasized in carbide milling because of the increased size of these forces and the greater speeds at which they operate. These forces and their proper direc-

• • •

Fig. 2. The individual blades are set to the shoulder of a fly cut with one blade wedged in position.



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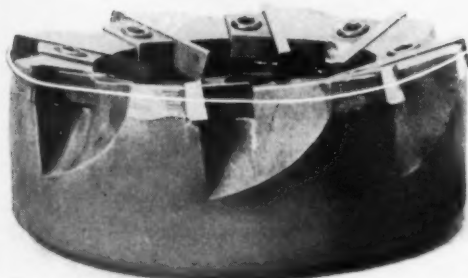


Fig. 3. The cutter used to mill the flat overarm. It is important that the blades be set to the shoulder so that all OD's will be in the same circle.

ting is of paramount importance in carbide machining and will determine frequently the success or failure of an operation.

The surface finish on this operation is specified as "better than a commercial" finish. This is easily effected as 15 micro-inches with the application of the proper technique. The chip load is .009" number of blades is 8. The feed per revolution, therefore, is .072". If the length of the zero line on the cutting face of the carbide blade is made equal to .100" the high blade (on the face, and there will be one blade that is high even though all have been ground in a cutter grinder) will clean-up the workpiece face, leaving no trace of feed marks.

The individual blades are set to the shoulder of a fly cut (with one blade

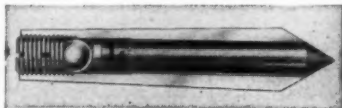
wedged in position as shown in Fig. 2. The remaining blades are then assembled by setting their OD's to the shoulder, not the face, of this fly cut. It is important that the blades be set to the shoulder so that all the OD's will be in the same circle, as indicated in Fig. 3. In this manner the chip loads of each tooth will be the same. The cutter body is so constructed that with this method of setting the blades all the cutting faces will be in the same plane as shown in Fig. 4, to within a reasonable run-out. But whatever the run-out, providing it is reasonable, the high blade, if ground as indicated, will "clean-up" the workpiece face and leave a superior finish.

The fly-cut can be taken in the workpiece or in any chunk of material set on the table for that purpose. Note that by taking a fly cut the run-out in the

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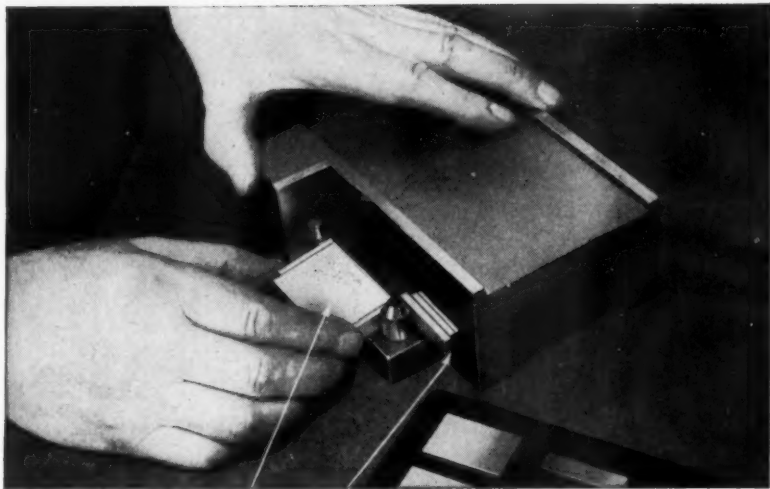
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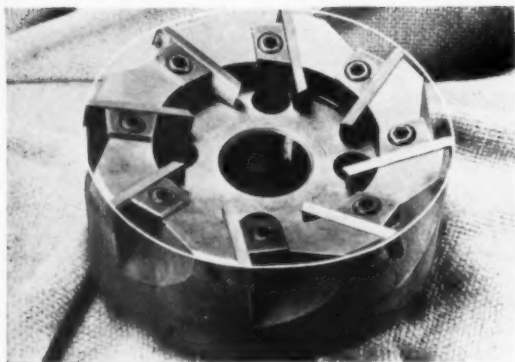


Fig. 4. The cutter body is so constructed that with the method of setting the blades to the shoulder to make sure the OD's will be in the same circle, all the cutting faces will be in the same plane.

spindle is eliminated and hence an absolutely accurate cutter set-up is achieved. This is frequently of considerable moment in the milling of components where tolerances are very close.

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sitioning, it is easily remedied. In a vertical machine the head can be shimmed top or bottom to cock it as desired. It is preferable to shim the lower left and upper right if the cutter is to be shifted away from the observer to the right. The shimming should be done on the lower right and upper left if the cutter is to be brought closer to the observer and therefore to the left. The former kind of tilting is done when heeling of the cutter is to be prevented when feeding the workpiece from the left to the right; the latter when feeding the workpiece from the right to the left.

The finish results on this job were by profilometer check 15 micro-inches. This is considered excellent on material that is no harder than 180 BHN.

This operation formerly effected with other than sintered carbide materials was done at a feed rate of 5" per minute. This compares with the 30 ipm rate selected for carbide milling. The cutting time therefore was reduced in the ratio of 30 to 5; the 40" long flat was milled formerly 9½ minutes; now in 1½ minutes. The cutter life increased exactly 75% and the grinding cost was reduced by 90%. The knee type vertical mill was not altered in any detail except the mounting of the carbide cutter in place of the older mill.

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Gas, Arc and Spot Welding procedures are discussed. Magnesium need not be dangerous if proper safety precautions are taken. (Textual matter, drawings courtesy the Dow Chemical Company.)

All magnesium alloy fabrications may be joined by gas welding, argon or helium arc welding, or spot welding. Gas welding on magnesium alloys is limited to butt joints because the flux used is likely to cause corrosion if it is entrapped in the weld, but all types of joints can be used with the shielded arc welding.

Cleanliness of the surface is of prime importance, regardless of method chosen. Oil, grease and dirt are effectively removed with solvents such as gasoline or carbon tetrachloride. Steel wool or aluminum oxide abrasive will erase any traces of oxide or chemical treatment remaining and give a smooth clean surface prior to welding.

If the material is to be spot welded, sheet metal should be ordered in the oiled rather than the chrome pickled finish because the former cleans easier. Also contacting surfaces and surfaces that will be in contact with the electrodes should be cleaned to a bright polish with a steel wire brush, wool or aluminum oxide abrasive cloth. After mechanical cleaning, brushing will remove any loose particles. Surface coating of chrome pickled sheet is taken off with aluminum oxide abrasive cloth.

EQUIPMENT

In gas welding, standard gas-welding equipment, as used in general aircraft work, is suitable for most applications. Flux is prepared by mixing two parts

of powder with one part of water and may be stored in glass or porcelain containers, covered to prevent evaporation of the water and keep dirt out.

To arc weld magnesium, operators may use a standard d-c arc welding generator or rectifier equipped with variable current control in the desired range and welding torch similar to the one shown in Fig. 1. The operator's equipment should include the usual helmet and gloves.

Spot welding requires standard a-c or d-c welding machines. Good control is of primary consideration, because welding time is short and currents high. Electrodes are made from hard, high conductivity copper alloys. They should be water cooled, preferably to within $\frac{3}{8}$ " of the welding face. Of the various tip contours suitable, dome tips generally give the best results.

JOINTS AND PREPARATION

The thickness of the stock determines how the joints shall be prepared in gas welding. Up to 0.125", the edges may simply be butted together. Less than 0.040", flanged abutting edges are recommended. The flanges should be 1/16 to $\frac{1}{8}$ " high. Sheet, thicker than 0.125", should be beveled to a 90 to 120 degree V, which should stop short about 1/16" of the bottom of the sheet, leaving a lip or root face. Gas welds in magnesium alloys are limited to single pass welds since multiple beads provide opportunities for flux entrapment. Approximately $\frac{1}{4}$ " is the maximum thickness that can be gas welded in a single pass. See Fig. 2 for preparation of joints.

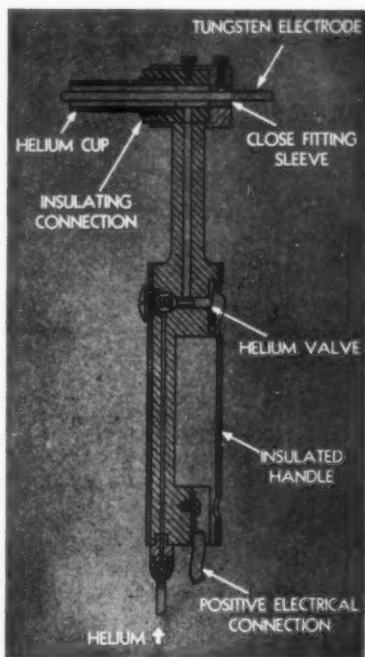
Edges of unrestrained parts are simply butted together for welding, but a gap of about 1/16" should be allowed in restrained parts for warpage and shrinkage. Assemblies usually are held in a jig while tack welding to maintain proper fit-up. Jigs should hold the work firmly to prevent warping, but loosely enough so the metal can expand and

contract. Close tolerance jobs may be held in the jig until welding is completed.

All of the magnesium alloys can be arc-welded and all types of joints utilized since entrapped flux does not enter into the picture here. Instead helium or argon gas is the agent which prevents burning and is blown from an outlet in the welding torch. A flowmeter regulates quantity of gas most efficiently. The degree of purity of helium employed is an important element to consider. Water vapor in helium decom-

• • •

Fig. 1. Principles of arc welding torch for magnesium.





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Fig. 2. Preparation of magnesium joints prior to gas welding.

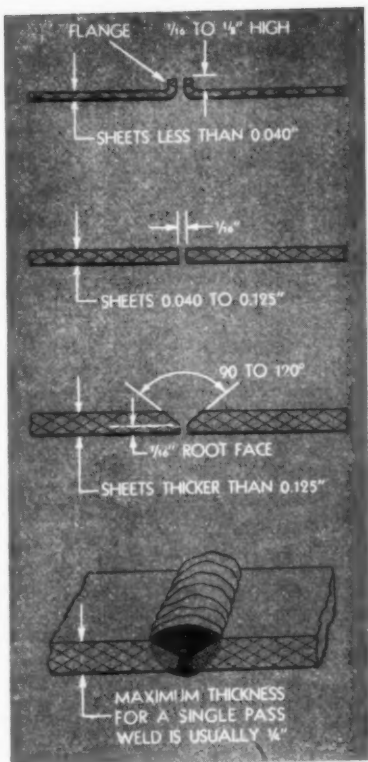
poses in the arc and yields hydrogen and oxygen, and hydrogen causes porosity and the oxygen forms a film over the metal, resulting in poor fusion and inclusions. The presence of nitrogen necessitates reduced welding speeds. A satisfactory analysis of helium follows:

Helium	97.8%
Carbon Dioxide	0.2
Nitrogen	1.6
Water	0.029
Hydrogen	0.2
Hydrocarbons	Nil

A backing plate behind the seam is desirable in arc welding. See Fig. 3. The plate prevents excessive metal "drop down," holds material in line, and may be used after welding for straightening and stress relieving. To avoid a concaved underside of the weld due to contraction of the cooled weld material, the backing plate should have a small groove directly under the seam rather than be perfectly flat. It is sometimes desirable to actually "cast in" the drop-down, in which case the groove should have the approximate dimensions indicated in Table I.

WELDING TECHNIQUE

In gas welding, the operator first brushes the flux paste on the welding rod and onto both sides of the seam, and tack welds the work at intervals of



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1½ to 6 inches, depending on the thickness of the material—the thinner the material, the closer the tacking. The torch is held at a 60 to 90 degree angle to the work when tacking (Fig. 4A).

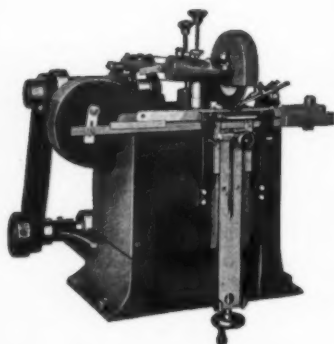
When actually welding, the operator holds the torch at a 45 degree angle. The area at the beginning of the seam is slowly preheated with a fanning action of the flame in order to dry and gradually fuse the flux, for if preheating is not too rapid, the flux will be blown off and the metal burned. While welding, the flame is moved forward in a straight line rather than in a circular motion, and the rod is dipped into the puddle at intervals, instead of remaining in the puddle continuously. It is important to make as long a weld as possible. When stopping, the torch should be raised gradually from the bead so that solidification takes place slowly. When starting again, the bead is re-fluxed at the previous stopping point,

BACKING PLATE GROOVE DIMENSIONS

SHEET THICKNESS inches	GROOVE DIMENSIONS	
	DEPTH inches	WIDTH inches
0.040	1/32 TO 1/16	1/8
0.064	1/16 TO 1/8	1/8
0.080	1/16 TO 1/8	1/8
0.100	1/16 TO 1/8	1/8
0.125	1/16 TO 1/8	1/8 TO 1/4
0.188	1/8 TO 1/4	1/8
0.250	1/16 TO 1/8	1/8 TO 1/4
0.375	1/16 TO 1/8	1/8 TO 1/4

TABLE 1

• • •



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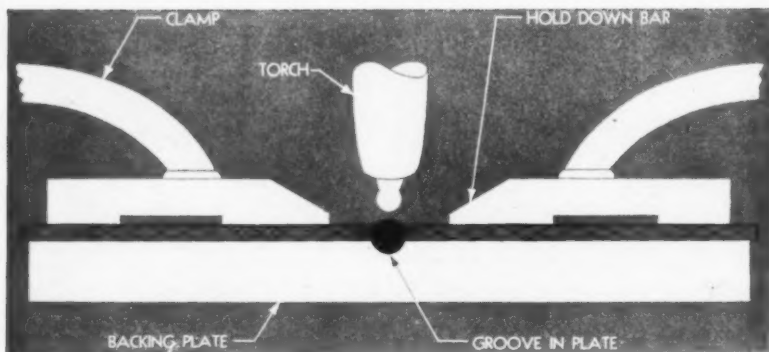


Fig. 3. The backing plate method of arc welding prevents excessive metal "drop down".

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and if the part has cooled, the area around the bead should be slowly preheated and the flame concentrated about $\frac{1}{2}$ " back from the end of the bead. See Fig. 4B for welding technique.

When a cast fitting is to be welded to a sheet metal part, the casting is tapered to the thickness of the sheet, preheated to 600 or 700 degrees F., and tacked about $\frac{1}{8}$ " above the surrounding metal. A $\frac{1}{16}$ " gap should be allowed between the two pieces. The welding of the seam will draw the part down into proper position.

In argon or helium arc welding, the

arc is struck on the magnesium surface by a light brushing action of the electrode which is quickly drawn back from the metal. When metal becomes molten under the arc, the filler rod is advanced into the arc which rapidly bites off small pieces of rod. The filler rod should not be pushed into the puddle. The torch is held as close as possible to the magnesium surface, as demonstrated in Fig. 5 to concentrate the arc and keep the bead to a minimum width. The filler rod preferably is held at an angle of not more than 30 degrees to the work being welded, and the rod and torch are maintained at an angle of approximately 90 degrees to each other. Fig. 6 illus-



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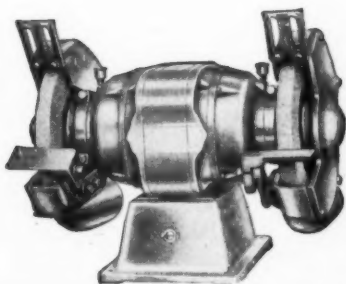


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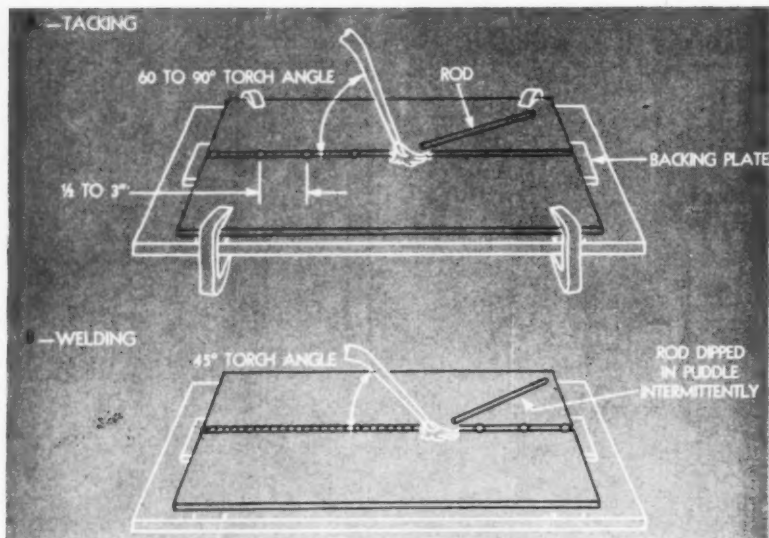


Fig. 4A-B. Sketches showing technique used for tacking and gas welding magnesium.

• • •

trates the angular relationship between the torch, rod and work.

To obtain smooth welds, the torch and filler rod are moved along at a constant rate of speed. The best welds are made by starting the bead at one edge and working to the other with as few stops as possible. If stops are necessary, the weld should be started back about $\frac{1}{2}$ " from the end of the weld when welding is resumed.

The flow of protective gas should be continued for several seconds after extinguishing the arc to prevent excessive oxidation of the tungsten electrode.

In spot welding, type of equipment determines technical details, and manufacturers of equipment furnish welders with necessary data on their machines.

The electrodes require frequent polishing with abrasive cloth. Softer alloys require more frequent polishing than hard—after every 10 welds as opposed to as many as 150 on hard material.

A good spot weld should have a penetration of about 50%, although a range of 30 to 80% is usually permissible (Fig. 7).

FINISHING

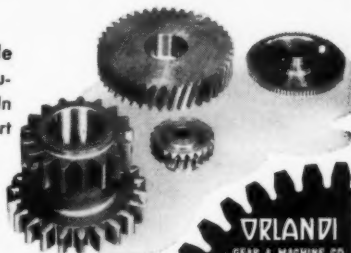
In gas welding, as soon as the metal has cooled sufficiently for handling, the weld must be cleaned. To remove all traces of flux, the welded area should be thoroughly washed in hot running water, scrubbed with a stiff bristle brush, treated in a chrome-pickle bath, washed in cold running water, boiled

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for two hours in sodium dichromate and water solution, rinsed in cold running water, and finally dipped in boiling water. If the weld bead is subsequently ground off, the cleaning procedure should be repeated.

The finishing operation for arc welded magnesium is not so elaborate as for gas welding. The welds are simply wire-brushed, and are then ready for the usual chemical treatment applied prior to painting.

In spot welding, the copper electrode leaves a deposit which must be sanded after welding, to prevent corrosion. A suitable chemical treatment follows,

after which the part is painted according to accepted procedure.

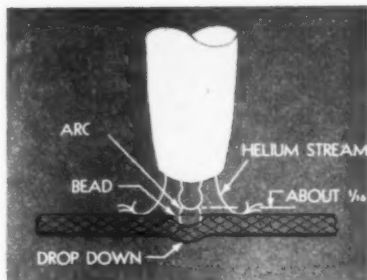


Fig. 5. End view of arc welding operation.

Fig. 6. Angular relationship between torch, rod and work.

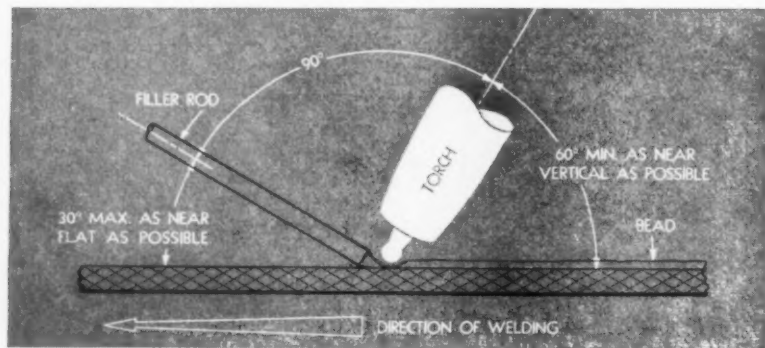
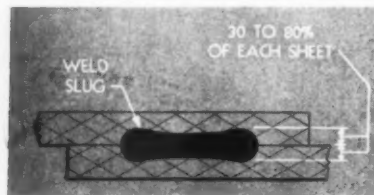


Fig. 7. Cross section of a good spot weld in magnesium.



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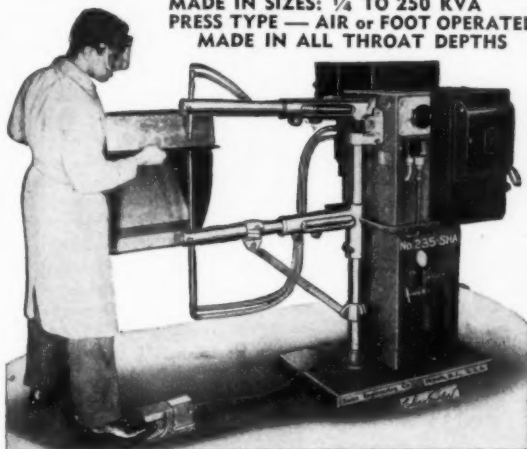
Fear of fire has prevented some manufacturers from using the metal when an application of magnesium would have been worthwhile. The truth is, however, that magnesium presents only minor fire hazards if proper precautions are taken.

Magnesium alloys must be heated to their melting points before they will

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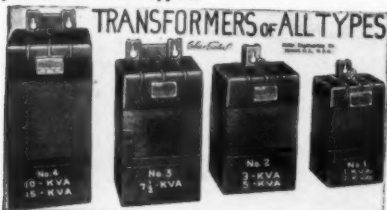
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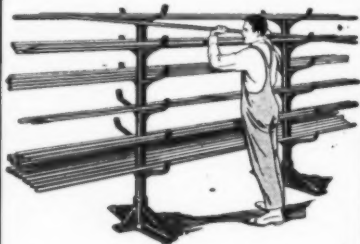
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ignite. Roughing cuts and medium finishing cuts produce chips of such a size that they are not readily ignited during machining. Fine cuts, however, produce chips which sometimes will ignite if produced at high cutting speeds. Stopping the feed and letting the tool dwell before disengagement, and letting the tool or tool holder rub on the work will produce extremely fine chips; consequently, these practices should be avoided. Factors tending to increase the fire hazard are: high cutting speeds, extremely fine feeds, dull or chipped tools, improperly designed tools and poor machining techniques. With sharp cutting tools, it is necessary to use a feed of less than 0.001" and cutting speeds in excess of 1000 feet per minute to create a serious fire hazard. Even under the most adverse conditions, that is with dull tools and fine feeds, the fire hazard is very slight at speeds below approximately 700 feet per minute. Sand cast surfaces, oxide inclusions, and ferrous inserts which will cause sparks when hit by the cutting tool, increase the possibility of fire.

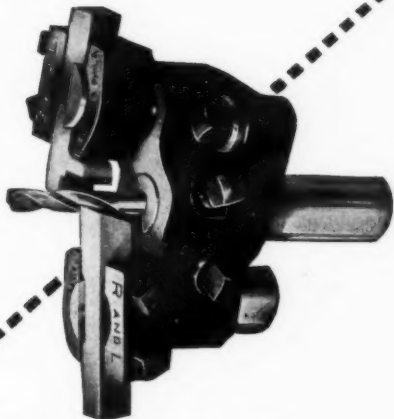
The use of a sufficient quantity of cutting fluids will practically eliminate any possibility of fire when machining magnesium at any cutting speeds. Also magnesium chips and dust should be removed at frequent intervals and stored in clean, plainly labeled, covered metal cans; machines and adjacent floor areas should be kept reasonably clean; supply of recommended fire extinguishers should be within reach of the operators; no smoking should be allowed in the vicinity of machining operations; and open flames and sparks must be kept away from finely divided magnesium—welders should be warned of this hazard.

DUST COLLECTION

The grinding and polishing of magnesium and other metals produces inflammable dust which, in the proper proportions with air, can ignite with explosive violence. It is essential, there-

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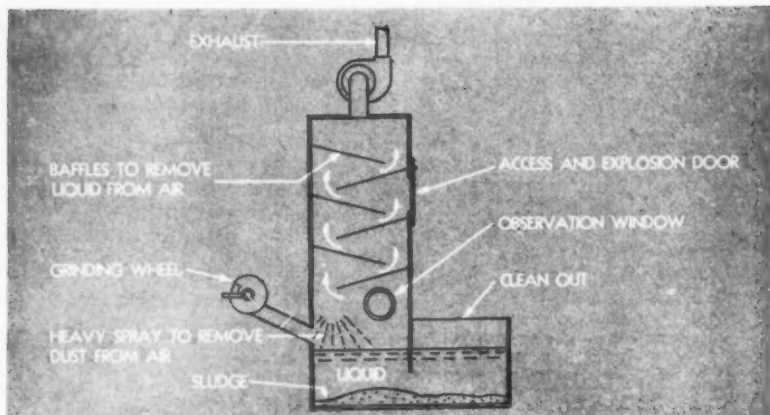


Fig. 8. Recommended type of dust collector for use with grinding wheel stands.

• • •

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fore, that this dust be immediately removed from the working area to prevent the formation of explosive mixtures. This can be done effectively with a dust collecting system of the proper design. A system considered safe for the collection of magnesium grinding and polishing dust is one in which the dust is precipitated by a heavy spray of water or low viscosity mineral oil to form a sludge with a great excess of fluid. The equipment should be designed to prevent the accumulation of dust or sludge in any location where it could dry out to an inflammable composition. Periodic inspections should be made of the collecting systems to insure against such conditions. The best collectors for grinding stands are small units which serve one to two stands and have the power supply for the grinder, water circulation, and air blower interconnected so that the grinders cannot operate without having the collector in operation. The grinders should be con-

nected to the collector by short, straight ducts. Fig. 8 illustrates the recommended type of dust collector for grinding stands. A central system that serves a large number of grinding tools or stands can be operated safely if the dust is precipitated by heavy sprays at each booth or stand. The dust should be conveyed by a flowing stream of water or oil to a central settling tank from which it is removed. Such a system will be safe if dust or sludge does not accumulate in the ducts. The power for the grinders, air blowers, and liquid circulation should be interconnected, as in the smaller unit system.

Sludge pits should be adequately ventilated to prevent the accumulation of hydrogen gas. The sludge which collects under the liquid in the pit should be removed frequently and disposed of by mixing with five parts of sand and burying or by spreading in thin layers on non-combustible surfaces and burning after it has partially dried. The same principle of dust collection can be applied to grinding and polishing booths where the work is done on a grating as shown in Fig. 9. The flow of air in the hood is past the work, through the grating and through a liquid spray which removes the dust. The hoods or booths should be designed to catch as much of the dust as possible, keeping it off the floor and workmen's clothes.

Central collecting systems in which the dust is passed through long, dry or partly dry ducts and the conventional dry type filter collectors are dangerous and definitely not recommended for the collection of magnesium dust. Accident records for systems of these types have proved them to be hazardous.

Magnesium alloys present a real fire hazard only when molten or in a finely divided form. Powder dust and fine chips or shavings of this metal are easily ignited and consequently present a

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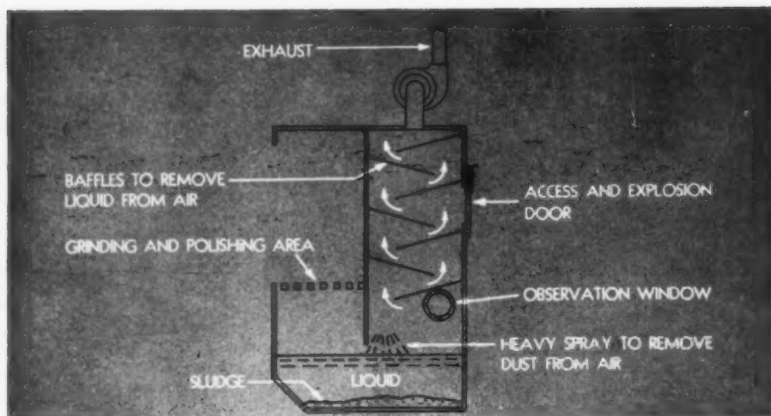


Fig. 9. Recommended type of dust collector for grinding or polishing booths.

• • •

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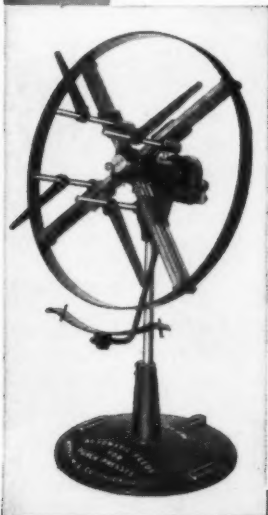
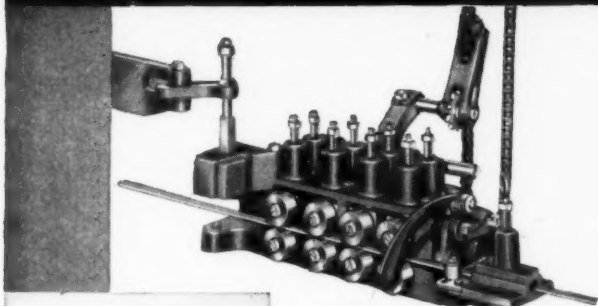
danger which must be continually recognized and controlled.

Finely divided magnesium turnings, shavings, and dust, when moist with water soluble cutting oils, present a fire hazard. When ignited, such wet mixtures burn with violence; hence water type cutting fluids are not recommended for use on magnesium.

Magnesium needs oxygen to burn, and cutting off the oxygen supply will extinguish the fire. A prepared extinguisher, G-1, available from The Pyrene Mfg. Co., is an effective extinguishing agent.

Carbon-dioxide gas, dry chemical, foam type, and the vaporizing liquid type extinguishers should not be used on magnesium fires as they accelerate the burning and may result in spattering. If the fire is small, however, sand, asbestos or talc will smother the fire, but a large amount in relation to the size of the fire is necessary. On the other hand, if the fire is active, the

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oxygen in these agents causes the fire to burn more intensely. Water can be used to control magnesium fires, but must be applied judiciously to avoid scattering the fire.

At the first sign of fire, the burning metal should be covered with a layer of G-1, ½ to ¾ of an inch in thickness. Further smoking indicates active fire, and more G-1 powder should be stirred gently into the metal wherever smoke appears. According to a bulletin on "Fighting Magnesium Fires," issued by the National Board of Fire Underwriters, "Tests have shown that automatic sprinklers are effective in preventing the spread of magnesium fires, and it is believed the operation of water from a sprinkler system materially lessens the amount of molten metal which may be produced, as it keeps the heat from rapidly building up."

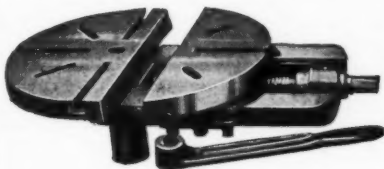
Proper technique will extinguish a magnesium fire, even on a combustible surface. A layer of G-1 is spread over the fire and on the wooden surface near the fire. Then all the burning metal is immediately shoveled on top of the layer of extinguisher powder or into an iron drum, possessing a cover and containing a layer of G-1 powder.

A small amount of G-1 powder sprinkled on or rubbed into the wooden surface that has been ignited by the original metal fire will extinguish the burning wood.

The following safety program is recommended as a precaution against magnesium fires.

1. Train all workmen in proper working methods and safe handling technique for magnesium.
2. Notify city and plant fire departments that magnesium is being used in the plant.
3. Educate firemen and workmen as to proper fire prevention and fire extinguishing.
4. Keep plainly marked, covered containers of G-1 at all machines and at all

Use the COMBINATION DRILL TABLE and VISE



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Simplifies the most difficult set-ups. Holds work of all shapes securely, without angle plates, clamps or supports. Just drop in the work and start to drill.

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We guarantee the Combination will save its cost in labor alone in six months. You are the judge.

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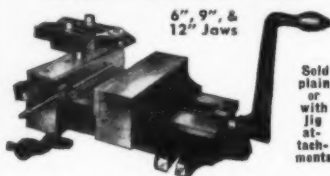


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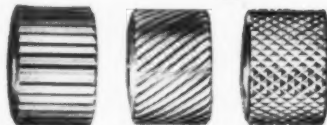


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In sizes up to 124 lbs., serves as plain vise, or with V jaws, shell jaws, stops, guides, etc. as repeat-operation fixture on drill press, planer, shaper, miller, grinder.

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giving full details of applications and prices.



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strategic locations thruout the plant.

5. Post proper warning signs at convenient locations around work places and at the entrances to rooms in which magnesium fires might occur. These signs should emphatically warn fire fighters as to proper extinguishing methods.

6. Give consideration to safety clothing for the workmen engaged in melting or grinding jobs. A simple method of making canvas and denim fire-retardant consists of dipping clothing, after washing and wringing, in a 15% solution of either di-ammonium phosphate or ammonium sulfamate. After thorough saturation, place the clothing in draining rack, and let excess drip off into tank. Squeeze clothing lightly and allow to dry.

Clothing treated by this method will char but not flame, when it comes into contact with molten magnesium. Ammonium sulfamate may be found to be less irritating to men with sensitive skin. Operators must wear goggles when working on melting or grinding operations and avoid the use of gauntlet gloves, sweaters or other fuzzy clothing. Grinding dust that settles on the clothing should be brushed off.

7. Install showers for the extinguishing of clothing fires at accessible locations in, or just outside rooms in which fires may occur. Equip showers with quick operating valves, easily located and opened. The End.



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A.S.A. STANDARD
Immediate Delivery
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Fast service on specials

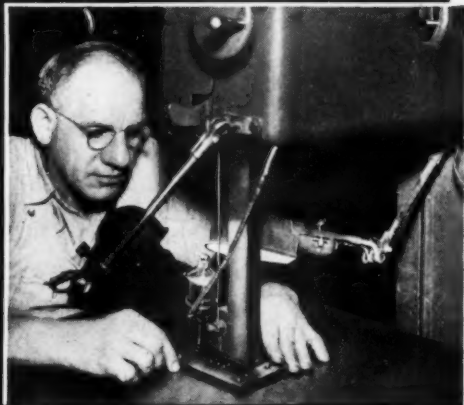
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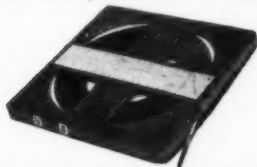
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Atlantic's strong, practical box, plainly marked on sides and top. Remains in good condition until entire coil is used.

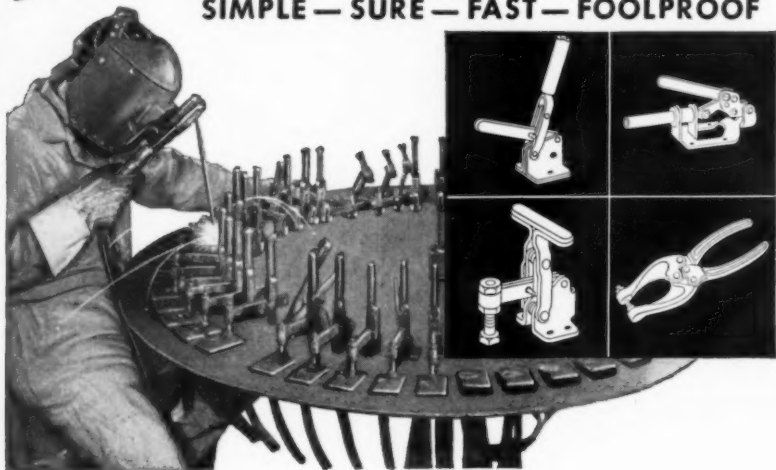
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Smart tooling like this is the backbone of modern mass production technique. You'll see De-Sta-Co Toggle Clamps playing a similar vital part *wherever* the principles of sound tool engineering are observed.

Welding production is *only one* of the many fields for quick acting clamps. For holding parts in milling, drilling, routing, riveting, cementing—for fast, uniform, *foolproof* action—progressive tooling demands De-Sta-Co adaptability and quality. There's a De-Sta-Co clamp for every job, designed and built to stand up under the wear and tear of volume production. Send for copy of Catalog No. 47.

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News of the industry.....

NATIONAL MACHINE TOOL SHOW OFFERS ANSWER TO TODAY'S INDUSTRIAL ILLNESS

According to a booklet recently published by the Kearney and Trecker Corporation, "The days when time was a fair measure of a man's productivity are almost gone. Today, a man's productivity is no longer measured by the hours and minutes he works, but rather by the capacity and efficiency of the machine he operates.

"But," according to a survey reported in the same booklet, "59% of privately owned machine tools are over 12 years old today." If the quotation above is



accurate, many of the tired machine tools in use today are not conducive to the highest possible production efficiency. The answer to increased production was succinctly stated by Mr. L. E. Osborne, Vice President in charge of operations, Westinghouse Electric Corporation. Speaking before the 11th annual Westinghouse Electrification Forum, Mr. Osborne stated, "If output per man is to be increased, is to catch up with the other half

of the unit cost team—wages and salaries—it will have to be done with more fully automatic machine tools and with production processes that reduce the human equation to the greatest possible extent."

At this point, the value of the coming



National Machine Tool Builders Show, to be held in Chicago September 17 through 26, becomes apparent. Here will be exhibited the latest developments in machine tools. Many of these models will be the result of intensive wartime research. Because the machines built during the war were constructed along the models in use during the 1935-1940 period, the tools to be displayed in Chicago during the tool show will represent the latest in machine tool design.

These exhibits will include the latest equipment and newest developments of

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481 1/2 W. Lennox Blvd., Inglewood, Cal.

over 250 manufacturers, more than 1,000 new machine tools, forging machines and other metalworking machinery and equipment. It will be the first show held since 1935 and the biggest one ever held.

One hundred thousand top management, production, engineering and financial executives from all over the world will be on hand to exchange ideas and



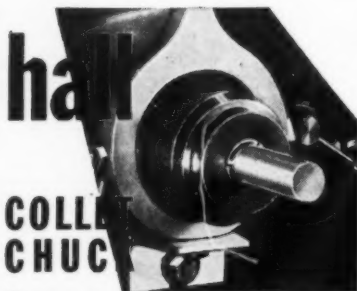
answer questions. Their vast experience will be at the disposal of visitors, who may acquire knowledge of all the latest developments in the machine tool industry. Recognized authorities will present papers covering outstanding new developments in metalworking techniques and processes at nightly sessions of the Machine Tool Congress. All who attend the show are eligible to attend the Congress.

In the hiatus between 1935 and 1947 machine tools were made and improved strictly for wartime uses. Ideas went on developing for peacetime tools, but did not have much of an opportunity to take concrete shape. Now the National Machine Tool Show has speeded up the transformation of plans into reality and will present the climax of all those ideas heretofore dormant.

All representatives who can do so should attend this Show. The more people who attend, the more ideas will be exchanged and production will undoubtedly be benefitted.

**Copy of booklet, "New Profits through Sensible Depreciation," may be obtained free of charge from Kearney & Trecker Corp., Milwaukee 14, Wis.

Millions of dollars worth of machine tools were offered by WAA to the nation's schools at 5 per cent of fair value for use in vocational training courses.



SPEED UP production in multiple operations with push-out type Hall Collet Chuck. Full spindle capacity or over. Tremendous grip over or under stock size to .007—without adjustments...no bearings, friction, heat or loss of power. Instant release without stopping lathe.

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AT 11TH ANNUAL WESTINGHOUSE FORUM

Over 300 engineers, executives of the machine tool industry, and electrical engineers and executives of Westinghouse and other metalworking plants met in Buffalo on April 22 and 23 for the 11th Annual Westinghouse Tool Electrification Forum sponsored by the Westinghouse Electric Corporation. Over 125 companies were represented.

The major problem confronting the machine tool and electrical industries were succinctly stated by L. E. Osborne, Vice President in charge of operations, Westinghouse Electric Corporation. "More production at lower cost is the only way we can reduce prices to consumers and make a profit necessary to keep in business." Speaking of labor costs, Mr. Osborne stated, "What we really did in the transition from war to peace was to pay labor in advance for production that did not materialize." While wages increased, the individual labor productivity rate decreased. What must be done if output per man is to increase? As we have in the past we must

turn to the same source, new designs, new materials and further mechanizations. "Increased use of mechanical power and of power driven tools and equipment must do the job. If output per man-hour is to be increased, is to catch up with the other half of the unit cost team—wages and salaries—it will have to be done with more fully automatic machine tools and with production processes that reduce the human equation to the greatest possible extent."

H. H. Mansfield, Chief Engineer, Greenlee Bros., in his paper on Electric Controls for Multi-Purpose Machines, proved Mr. Osborne's statements regarding the increased output to be derived from new designs and automatic processes. Mr. Mansfield described several types of transfer machines. One of the most interesting of these transfer machines, mills, counterbores, faces, bores and taps holes in refrigerator bodies. In one hour 188 pieces are produced, at 88% efficiency. The control circuit includes means for controlling any of the individual functions of the cycle, viz., operating the





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EVERYONE in your plant who does precision work can do it easier, faster, safer, better by wearing a Magni-Focuser. This binocular eye-loop enables you to see an object sharply magnified with the comfort and clarity of normal vision. Relieves eye-strain—lessens fatigue—reduces accidents. Allows free use of both hands. Available in different magnifications, from 2½ at \$9.50 to 3½ at \$10.50. If your distributor cannot supply you, order direct. Money refunded if Magni-Focuser does not help you see better.

EDROY PRODUCTS CO.

478 Lexington Ave., New York 17, N. Y.

transfer bar, clamping and unclamping, or correcting the individual push button control for each of the units so they can be operated individually to aid in tool setting.

Electrification of the Landis Centerless Thread Grinder was discussed by W. E. Happel, Landis Tool Company, and Mr. M. S. Gjesdahl, Pennsylvania State College.

Other papers delivered at the first day's meeting included: Wiring Systems for Station-Type Drilling Machines, by R. C. Heinmiller, Foote-Burt Co.; D-C Motor with Rectifier Power Supply, by E. C. Watson, Westinghouse; Breaker vs. Fuses for Branch Circuit Fusing, by Mr. I. W. Herchenroeder, Westinghouse.

The report of the Electrical Committee of the National Machine Tool Builders Association was given by E. J. Rivoira, Cincinnati Milling Machine Company.

A trip to the Buffalo plant of the Westinghouse Corporation featured the second day's session. AC and DC motors, control apparatus and welding equipment will eventually be manufactured in this 2,400,000 square foot plant. Approximately \$5 million is being spent to equip this plant. The total cost will run around \$36 million.

The plant tour was concluded with an address by Tell Berna, general manager of the National Machine Tool Builders Association. He discussed the present status of the machine tool industry and its future prospects. Mr. Berna pointed out that the competition of surplus machine tools would not change tremendously before the middle or end of next year, at which time a more normal situation would exist.

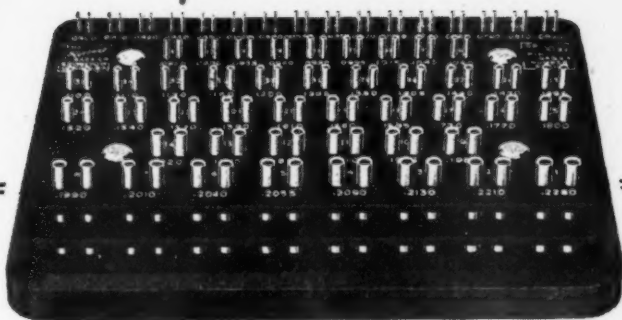
CARBIDE ENGINEERS FORM SOCIETY

The Society of Carbide Engineers announces its formation in Hartford, Conn. The object of the group is to broaden the knowledge of carbide application and help educate members thru talks, movies, and discussions on uses of carbide.

The first officers are: President, Bernard Blacker, West Hartford, Conn.; Vice-President, Ralph Stolze, Elmwood, Conn.; Secretary, Gerhardt Kuehn, New Britain, Conn.; and Treasurer, John Van De Water, West Hartford, Conn.

The Society has received a number of inquiries about the possibility of chapters in other cities and the executive committee is preparing regulations for chartering new chapters in response to these requests.

Present membership totals 52 members, all from the eastern states.



DRILL SIZE PIN GAGES

Class Z Accuracy

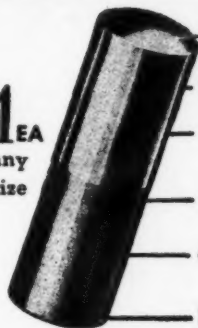
LETTER SET—52 gages in 26 pairs from A to Z. \$45 set.

FRACTION SET—60 gages in 30 pairs in steps of 1/64" from 3/64" to 1/2". \$50 set.

NUMBER SET—120 gages in 60 pairs from 1 to 60. \$90 set.

All sets include stands
... Prices F.O.B. Bridgeport, Conn.

\$1
any
size



Polished Radius Top

TOLERANCE $\pm .0001$ —.0000

Overall Length $1\frac{1}{2}$ "

LOWER HALF CONCENTRIC
TAPERED for easy insertion

Oil Hardened Tool Steel

Flat Ground Bottom

Sets in pairs of gages for checking any number of similar holes. Stands have 3 plates and cover so that gages stand upright. Drill size is plainly stamped in front of each gage hole, together with decimal equivalent to the ten thousandth of an inch.

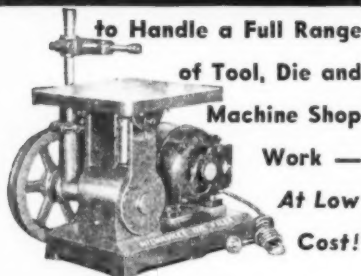
IMMEDIATE DELIVERY — 116 SIZES

Check or M.O. should include .08c postage for quantities less than Set. Sets shipped Express Collect. No C.O.D.'s.

THE *Horberg* GAGE COMPANY

19 STAPLES STREET, BRIDGEPORT, CONN.

YOU NEED BOTH



to Handle a Full Range
of Tool, Die and
Machine Shop
Work —
At Low
Cost!

The Milwaukee DIE FILER

is designed primarily for straight-line, sharp-corner filing, sawing and lapping in the softer metals preparatory to hardening. It is used extensively in the making of tools, dies, jigs and fixtures. It is highly efficient, sturdily constructed, has few moving parts. Adjustments are extremely simple. Saw overarm is quickly attached.



The Milwaukee PROFILE GRINDER

permits a high degree of precision in grinding interior and exterior profiles having curved, odd and irregular surfaces. It is especially adapted to the precision finishing of hardened steel parts. Spindle revolves at 20,000 R.P.M., reciprocates vertically 100 times per minute. Takes grinding wheels from $\frac{1}{8}$ " to $1\frac{1}{2}$ " in diameter. Write For Illustrated Bulletins.

Both Machines are Stocked and Sold Exclusively by Industrial Machinery and Mill Supply Distributors.

Milwaukee

CHAPLET & MANUFACTURING CO.

1027 S. 40th ST., MILWAUKEE 4, WIS.

SOUTHERN MACHINERY SHOW TERMED HUGE SUCCESS

The \$1,000,000 second Southern Machinery and Metals Exposition opened April 14 in Atlanta, Ga. More than 15,000 viewed the three floors of exhibits ranging from equipment manufactured in the South to machine tools and precision instruments from other parts of the country.

The majority of the exhibits were dramatized and in operation against specially designed backgrounds. Products manufactured in the South were coordinated with some of the exhibits of national companies. Steel companies participating in the Exposition showed dies, parts, stampings, and sub-assemblies manufactured in Southern plants. Finished products, manufactured in the Southeast attracted considerable attention. Machinery for the manufacture of concrete blocks, large metal trailers, material handling equipment, castings—steel, aluminum and bronze—machined parts, electrical equipment, and sub-assemblies from southern manufacturers were exhibited.

Seven steel companies were represented. Eleven displays featured material handling equipment such as conveyors, lift trucks—both gasoline and electrically operated—hoists, jacks and push trucks. Machine tools were shown in more than 20 exhibits. Seven foundry companies showed steel, cast iron and non-ferrous castings. Welding equipment, ranging from spot welding machines to low temperature welding processes, were shown by eight companies. Safety equipment was featured in four booths. Precision and measuring instruments were shown by five concerns. Wood working equipment was in operation at five different locations.

In addition plant tours were scheduled for the Auto-Soler Co., Atlantic Steel Co. and Southern Spring Bed Co.

The Exposition afforded Southern manufacturers an opportunity to view latest developments in machinery and equipment. The Exposition indicated that the industrial south is expanding and taking its place in the mechanical and technical development in the country.

ASTE ELECTS OFFICERS

W. B. Peirce of Pittsburgh, Pa., is the new president of the American Society of Tool Engineers. Peirce is vice-president

in charge of research at the Flannery Bolt Company, Bridgeville, Pa. Having served industry in executive capacities for over half a century, the new president is well known in manufacturing and engineering circles throughout the country.

Other officers elected are I. F. Holland, general superintendent, Small Tool and Gage Department, Pratt & Whitney Division, Niles-Bement-Pond Co., Hartford, Conn., first vice-president; R. B. Douglas, industrial engineer, Montreal Quebec, Canada, second vice-president; George C. Johnson, chief engineer, W. F. and John Barnes Co., Rockford, Ill., third vice-president; W. A. Dawson, branch manager, F. F. Barber Machinery Co., Hamilton, Ontario, Canada, secretary; and V. H. Ericson, vice-president, Johnson-de Vou, Inc., Boston, Mass.; Harry E. Conrad of Detroit was re-elected executive secretary.

The new president has declared war on the antiquated English inch system of measurement. He said that engineers must begin to think about adopting the simpler metric system, if the U. S. is to keep pace with the rest of the mass producing countries of the world.

Plans are being made for the next A.S.T.E. convention, the semi-annual meeting to be held in Boston, Mass., October 30 and 31 and November 1, 1947.

TOOL ASSOCIATION APPOINTMENT

Appointment of Alvin L. Krieg as assistant to the general manager of the National Machine Tool Builders' Association was announced here today by Tell Berna, general manager of the Association.

A former newspaperman, Mr. Krieg comes to this new post from the American Steel & Wire Company, United States Steel subsidiary, where he was assistant to the director of public relations.

A native of Lorain, Ohio, Mr. Krieg was State editor of the Times-Herald in that city prior to joining the staff of International News Service in Ohio. He served INS as legislative correspondent in Columbus; then for five years as Cleveland Bureau manager. In 1939 he joined Westinghouse Appliance Division where he was public relations director for two years. Then for a year he was civilian director of public relations for the War Department, Cleveland Ordnance District.

During the war he served with the Ninth Army in Europe as an Infantry Corporal.

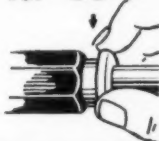


DUB LIFE PLUG GAGES WITH COLORED PLASTIC COLLETS (INSULATING)



RED for
"NO GO"

GREEN
for "GO"



DUB LIFE

Remember! — Colored Collets instantly identify plugs. They are weight reducing, lock securely and will not mar the finest finish.

United Precision Plug Gages are scientifically designed. They are made by skilled craftsmen from the finest gage steels. The latest in modern equipment for metal working and heat treating assures a high standard of perfection—dependable accuracy, maximum service at minimum cost.

UNITED PRECISION PRODUCTS CO.

SHABONNA, ILLINOIS

AMERICAN SOCIETY FOR METALS COMPLETES 1947 HANDBOOK

Twelve of the nation's technical leaders in the tool steel industry, members of the Tool Steel Committee of the American Society for Metals, have completed their correlation of data in connection with the society's 1947 Metals Handbook. This year's handbook, soon to be published, will be the first since the 1939 edition.

The announcement was made by W. H. Eisenman, national secretary of ASM, who today made public the names of the committee which, since 1940, has been engaged in preparing latest up-to-the-minute data on tool steels.

The Handbook's Tool Steel Committee consists of S. C. Spalding, chairman, American Brass Company, Waterbury, Conn.; W. L. Badger, General Electric Company, West Lynn, Mass.; A. D. Beeken, Vulcan Crucible Steel Company, Aliquippa, Pa.; J. P. Bindyke, Happenstall Company, Pittsburgh, Pa.; G. E. Brumbach, Carpenter Steel Company, Reading, Pa.; W. R. Frazer, Union Twist Drill Company, Athol, Mass.; W. H. Macmillan, Remington Arms Company, Inc., Bridgeport, Conn.; W. E. Mahin, Armour Research Foundation, Chicago, Ill.; J. H. McCadie, National Twist Drill and Tool Co., Detroit, Mich.; J. E. McCambridge, U. S. Navy Yard, Philadelphia, Pa.; H. E. Replogle, Universal-Cyclops Steel Corp., Bridgeville, Pa.; and G. A. Roberts, Vanadium-Alloys Steel Company, Latrobe, Pa.

Seventeen articles have been prepared by the committee for inclusion in the Handbook. The articles summarize heat treatments recommended for the tool steels used in industry. In order to correlate the large amount of information available and to reduce the number of steels to manageable proportions, it was necessary to prepare a condensed tabulation of tool steels according to the principal types that are used. Thus, the field of these special steels was reduced to approximately 50 principal types, which are the ones that will be discussed in the forthcoming Metals Handbook.

With both producers and users of tool steels represented in the manuscript, the final summary of information can be accepted as an authoritative and generally acceptable compilation.

The 1947 Metals Handbook will be distributed to more than 21,000 Society members in the U. S., Canada, Europe and

Asia. It also has a substantial distribution in domestic and foreign research and plant laboratories, libraries and technical colleges and universities. It is a standard reference book of metallurgical students.

First of the A.S.M. Metals Handbooks was published in 1926. It has been published at regular intervals since that time with the exception of the war period. The 1939 edition went through three printings totalling more than 50,000 copies.

DIVINE METAL FINISHING MACHINERY

Divine Brothers Company, manufacturers of Metal Finishing machinery and supplies, announce the publication of two new bulletins.

The first of these bulletins contains brief definitions of buffing and polishing operations, and shows a convenient table for estimating surface feet per minute from rpm for wheels from 4" to 24" in diameter. Recommended wheel speed for the various operations is shown.

The second bulletin describes the balancing tubes available in Clothflex Polishing Wheels—previously standard in the compress wheel and leather covered wheel. On the reverse of the same bulletin are descriptions of eight different wheel hubs available on polishing wheels. Copies of these bulletins are available by writing Dept. BB, Divine Brothers Company, 200 Seward Ave., Utica 1, N. Y.

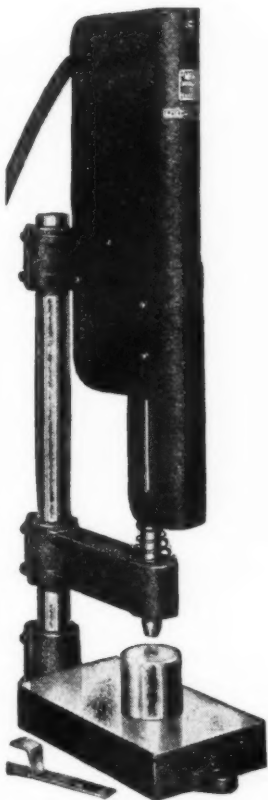
AIRCRAFT-MARINE SOLDERLESS WIRING

Compiled for design and production engineers, Aircraft-Marine Products Inc. announces a selection data book on their entire line of solderless wiring devices. This attractive, plastic-bound volume displays the various types of solderless terminals, their features and their applications in a series of concise, informative, illustrated charts, index-tabbed for quick reference.

Of special interest are the descriptions, complete with photomicrographs, of the types of pressure "crimps" developed by the company for installing solderless terminals in a variety of wiring applications. Other noteworthy features are a graphic terminal selector chart and actual samples of the various solderless terminals manufactured by the company.

A copy of this data book may be obtained by writing to Dept. BB, Aircraft-Marine Products Inc., 1581 North 4th St., Harrisburg, Pa.

Announcing the **MEAD**
Impact **AIR**
HAMMER



Ready . . . Mead's new air-powered Impact Hammer . . . weighing only 27 pounds . . . yet having a wallop like a pile-driver! One of its outstanding applications is multiple piercing of large metal sheets before or after forming. It can punch holes as close together as $1\frac{1}{4}$ " on centers. Value of the impact readily adjusted from 4,500 pounds down to only a few ounces. Set-ups are quick, easy. Besides innumerable punching operations, with suitable attachments it is capable of upsetting rivets, blanking out soft materials with knife dies, light coining, forging operations, etc. Get complete facts on this versatile, handy new tool and other Mead Air Power devices.

Write for Catalog.

MEAD SPECIALTIES COMPANY

4114 No. Knox

Dept. YA-67

Chicago 41, Ill.

ROCKFORD HY-DRAULIC MACHINE TOOLS

Information relating to Rockford Hydraulic Machine Tools is available in a single complete catalog. Divided into seven sections, this new catalog 1947, provides complete information on engineering and construction. Section headings indicated the content and are (1) the Hydraulic story, (2) planers, (3) shapers, (4) slotters, (5) shaper-planers, (6) special installations, and (7) representatives.

For each machine type, specification data is supplied in unusual detail. Organization of material has been especially worked out so that immediate reference can be made to any specific point in subject matter. Catalog 1947 is available to all metal working production executives by writing to Dept. BB, Rockford Machine Tool Co., Rockford, Ill., giving name and title.

HARDINGE CHUCKING MACHINE

Hardinge Brothers, Inc., have compiled a 27-page bulletin describing the Hardinge Multi-Operation Chucking Machine.

Through the use of blueprints and photographs, machining problems are set

up and solutions suggested by the use of the properly sized machine. Specifications of the machine are given, and pictures and accessories of the Chucking Machine add to the value of the bulletin.

Bulletin may be secured by dropping card to Hardinge Bros., Inc., Dept. BB, Elmira, N. Y.

SIBLEY DRILLING MACHINE

An attractive two-color folder has just been published by Sibley Machine and Foundry Corp., South Bend, Ind., illustrating and describing Sibley 24" and 28" drilling machines and accessories.

Features of design and workmanship are presented in such an arrangement as to minimize the time required to 1—compare Sibley construction; 2—determine cost and labor saving possibilities.

The new booklet details such design features as rotary geared coolant pump, geared tapping attachment, feed mechanism, motor drive and top frame assembly.

Anyone desiring a copy of the new Sibley 24" and 28" drilling machine catalog should write Sibley Machine and Foundry Corp., South Bend 23, Ind., Dept. BB mentioning this magazine.

FOR DOWNRIGHT EFFICIENCY IN SHARPENING SMALL DRILLS — YOU CAN'T BEAT THIS MOTORIZED GRINDER

BLACK DIAMOND

PRECISION DRILL GRINDER

For Small Gauge & Fractional Drills

Why waste skilled labor for grinding small drills when anyone can operate a Black Diamond — keep all small drills properly ground with true centers and uniform lips, at the proper angle and correct clearance for fast drilling.

Black Diamond grinding insures precision drilling, reduces drill breakage, saves expensive drill stock, cuts drilling time to an absolute minimum.

The built-in Diamond Dresser keeps the grinding wheel sharp cutting and the Web Thinning Attachment efficiently cares for the grinding of Notched, Colton or Crankshaft points.

Moderately priced, a Black Diamond cuts grinding costs 50% or more, quickly pays for itself in savings, wherever small drills are used in quantities.

More complete details on request.

BLACK DIAMOND SAW & MACHINE WORKS, INC.
45 NORTH AVENUE
NATICK, MASSACHUSETTS

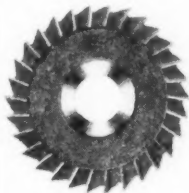


NO BINDING!



HOLLOW GROUND SAW

Sizes from $1\frac{1}{4}'' \times \frac{1}{16}''$
to $10'' \times \frac{3}{16}''$



SIDE CHIP SAW

Sizes from $2\frac{1}{2}'' \times \frac{1}{16}''$
to $8'' \times \frac{3}{16}''$

NO DRAGGING!

with

CIRCLE R
METAL SLITTING SAWS



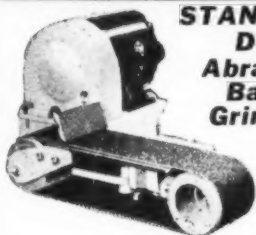
Here are two types of slitting saws for regular and heavy feed duty. The Circle R side chip slitting saw in particular is designed to take deep cuts, split chips and eliminate dragging. With all Circle R saws, in all sizes, there is no binding, no dragging.

For complete details and specifications on these and other Circular Saws, send for our Catalog L.

CIRCULAR TOOL CO., INC.

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STANDARD D-4 Abrasive Band Grinder

**Famous
for
Stamina**

This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x36 1/4" band. The ideal portable unit.

**OTHER STYLES AND SIZES IN NEW
MANUAL ON FINISHING—WRITE TODAY**

WALLS SALES CORP.
306 E. 38th St., New York 16, N. Y.

PARKING PROBLEM SOLVED BY USE OF ROOF

A novel and practical answer to the parking problem that has been bothering the Greater Boston Area, as well, undoubtedly, as many more cities throughout the country, is an "On the Roof" parking area built by Lewis-Shepard Products Inc., manufacturers of materials handling equipment, located in Watertown, Mass.

With an almost unsurmountable parking problem facing them, the firm's engineers, when drawing up plans for a new addition to the plant, devised the idea of constructing the roof so that it could be used as a parking area. The roof of this new building, which incidently was ready for use before the building was finished, is only three feet above the street level and is reached by means of an abbreviated ramp. There is a low cement safety rail around it and it will park from 75-80 cars.

This "On the Roof" parking, not only solved the parking problem but, with the company's 20,000 square feet already crowded with buildings and growing pains demanding more room, it solved the problem of obtaining more room for production.

FOR PRODUCTION STUD SETTING, DRILLING, TAPPING, AND ASSEMBLY

Automatic Self-Opening Stud Driver—100 Series



Titan-Kirkland Combination Stud Driver and Puller



Solid Type Stud Driver



Titan Quick-Change Chuck

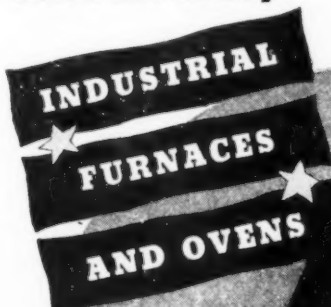


Other Titan Tools include Titan Collets, Safety Drive Chucks, Controlled Drive Stud Drivers, Titan Automatic Self-Opening Hanger Bolt Drivers.



WRITE FOR LITERATURE TODAY
TITAN TOOL CO.
Production Tools
47 MAIN STREET, FAIRVIEW, PA.

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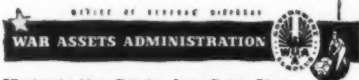
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10,000 INDUSTRIAL
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SPECIFICATIONS...



Somewhere in this large inventory there is a good probability that WAA has the furnace or oven to fit your requirements. But screening the inventory to find the specific equipment you need is a big job—so let WAA do the screening for you. WAA will then submit for your consideration that equipment in the inventory which appears to be of greatest interest to you, based on the data you submit.

The booklet shown contains pictures of many types of available furnaces and ovens. Send for this booklet and fill out the specification blank enclosed.

If you have not received your copy of this valuable new WAA booklet, clip and mail the attached coupon—NOW!



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Air-Hydraulic Press Licked This Knotty Problem for Century Precision Works, Inc.

The Air-Hydraulic Press is imbedding the nickel chrome heating element into the mud cast ceramic insulation of the Glide-O-Matic electric iron... maintaining a uniform thickness all around the coil.

AIR-HYDRAULIC PRESS DOES BETTER ASSEMBLY, FORMING, MARKING, ETC.

2 Models — 2½ and 6 Ton Capacities

Do you work in metals, plastics, leathers? Investigate the operating advantages of this new press... no noise, no impact shock damage, no operator fatigue. Ideal for women operators. Adjust the pressure from the most delicate squeeze up to 2½ or 6 tons pressure. Operate by hand, foot, or by completely automatic controls. Ask for the new brochure showing a wide variety of work done by and specifications of these A-H Presses.



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HAMMOND
BACKSTANDS
CONVERT GRINDERS and POLISERS
into high production
ABRASIVE BELT UNITS

MODEL No. 3

**WRITE FOR
CATALOG NO. 55**
—covering complete line
of Hammond equipment.

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Hammond
of KALAMAZOO
1000 HICKORY STREET
FINISHING PRODUCTION
REACHES A NEW PEAK

Above: "VRO" Polishing Lathe with two No. 3 Backstands.

FORD TERMINATES AGREEMENT WITH FOREMAN'S UNION

The following letter was sent in April by John S. Bugas, vice president and director of Industrial Relations, Ford Motor Company, Dearborn, Mich., to Robert Keys, president, Foreman's Association of America, National Division:

"This is to advise you of the decision of the Ford Motor Company to terminate the present agreement between the Foreman's Association and the Ford Motor Company.

"As you know, under the terms of the agreement it may be terminated on May 9, 1947, provided either your association or the company gives thirty days' notice. It is the purpose of this letter to give such notice.

"Our present agreement with you was entered into voluntarily on May 9, 1944. At that time we took the position that whether or not we believed that foremen's unions or associations were sound, we would undertake a practical test. This is in line with our policy of always seeking workable solutions to our human relations problems here at Ford. As you are aware, this company, in reaching the 1944 agreement with you, took a position not supported by the general opinion of industry.

"At that time, representatives of your Association argued that recognition of a foreman's union would result in making foremen more effectively a part of management than before.

"After three years' experience—a period which seems to us ample for a test—it is our conclusion that the results have been the opposite of what we have hoped for. Rather than exerting its efforts to draw foremen into closer relationship with the rest of management, your Association has worked in the opposite direction. We feel that your Association under the agreement has failed to meet the test of practice.

"As recently as... April 5, 1947, thirty-three foremen, all except three from the Rouge Rolling Mill, walked off the job without permission, and contrary to specific instructions to remain. They stayed off the job about two and one-half hours, attending a meeting of the Association. This unauthorized absence involved grave risks to our employees in the rolling mill. The fact that no damage came to men or property was fortunate, but it is some-

thing which the absent members of your Association could not guarantee.

"Efforts were made—we are glad to say unsuccessfully—to induce foremen in the Open Hearth Department to leave their jobs at the same time. There is no need to point out the risk to men and property in leaving open hearth furnaces unattended.

"Your Association recently instructed its members not to comply with Company requirements that they check employees under their supervision at various locations away from the job where they were felt to be loitering. Spokesmen for your Association did not agree with the Company as to the proper technique for handling an admittedly bad situation. It is clearly the responsibility of the Company, and not of your Association, to determine the procedure in such situations.

"Several months ago we proposed a number of constructive amendments designed to improve our relationships, to define more clearly our separate areas of responsibility, and to close the gulf between foremen and other members of our management team which we feel has been created by the present agreement. In several months of negotiation, your negotiating committee has not agreed to a single major proposal. Your committee has also failed to produce any counter-proposal which would lead to these goals.

"The Ford Motor Company has the present and long-term objective of building an exceptional organization of the ablest people. We cannot reach this objective unless we develop within the organization the finest and best-trained foremen in the country. The Association is not helping us to advance toward this objective.

"The essential characteristic of management is responsibility. It follows that the characteristic which distinguishes a foreman is a sense of responsibility. It is our observation that the activities of your Association under our agreement has tended to lead our foremen away from management responsibility, and has in fact opposed efforts of the Company in this direction.

"We are giving you this notice of termination of our agreement for the practical reason that it has not worked under test."



**ARE YOUR TOOLS
PRODUCING AT
MAXIMUM?**

In manufacture of special tools for maximum production the skill of the tool craftsman is the most essential element.

Andersons, Inc., specializing in precision tools and fixtures are so manned and equipped as to assure the best in tool design and craftsmanship.

Your inquiries for special tooling are solicited and will receive prompt efficient service. Let us help you solve your tooling problems.

GAGES, FIXTURES, SPECIAL TOOLS

FORM TOOLS—DOVETAIL AND CIRCULAR
MILLING CUTTERS—END MILLS—REAMERS

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Andersons, Inc.



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SCHAUER SPEED LATHES CUT PRODUCTION COSTS

Users report Schauer Speed Lathes reduce finishing costs 50% to 90%!

They lap, de-burr, polish, finish small metal and plastic parts faster, better, and at far lower cost.



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Catalog
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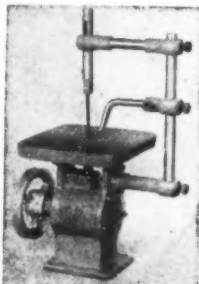
THE SCHAUER MACHINE CO.

Originators of today's Speed Lathes

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Die Filer and Saw

A versatile tool for every
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Bench Model \$67.50
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File is fixed in its up and down stroke, assuring precision filing. A adjustable table, can be locked for precision angles. Overall arm removable for small internal filing. Use as jig saw . . . sawing plugs for die punches . . . general contour work.

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FEDERAL PRODUCTS SPONSORS QUALITY CONTROL CONFERENCES

Industrial demand for increased training in Quality Control culminated in seven Quality Control Conferences during 1946 and early part of 1947 by Federal Products Corporation at their plant in Providence, Rhode Island.

Each conference was intended to demonstrate to supervisory personnel where and how quality control can effect savings in plant operations thru prevention of scrap, rework and accompanying wasted man and machine hours. By presenting practical material in factory surroundings, it was hoped that trainees would benefit more than merely from the study of hypothetical situations.

The number of visiting participants was limited to 15 to insure maximum personal participation. Staff of chairmen, advisors and instructors, equipped with wide experience in their particular fields, led the discussions. The lecture method of presentation was avoided as much as possible, and open discussion with demonstrations of techniques, practices and equipment was encouraged.

For those interested in extra curricular discussions, the daily schedule allowed time between periods to permit further instruction or demonstration. Extra sessions, for instance in the evening, were agreed upon for those who found the pace too fast. Participants were even invited to remain over into the following week, if they so desired, for additional help, instruction or practice in any one or several of the conference subjects.

The following, taken from one of the programs, is a representative list of subjects covered:

Quality Control

Practical description or the statistical technique and profitable applications. Shop use of acceptance sampling, single, double and sequential sampling, of per cent defective methods, standard deviation, average and range, batch and shop control

Inspection

Visual and 100% inspections

Selection of help, training, administration. Gaging, sorting, detailing, quality checks, scrap and salvage disposition.

Patrol Inspection

First piece sampling, timing, equipment

Organization and Management of Inspection and Quality Control
Responsibility of the quality

organization to management, the customer, to production, supervision and the worker. Position of quality control and inspection in the organization. Some prevailing organization charts

Gaging

Conventional gages, plug, snap, thread gages
Gage blocks
General inspection and gage lab equipment
Indicating, electric, air, electronic gaging systems

Gage Design

Principles
Common errors
Auxiliaries and attachments
Reference point
Gaging pressures
The workpiece
Design for O.D., I. D., concentricity, out-of-round, offset, taper, flatness, radius and spherical
Multiple and sequence gaging.

FORM CONNECTICUT PRECISION CASTING CO.

The Connecticut Precision Casting Company has been formed by C. T. Finn and B. T. Butterworth, Jr. of New Canaan, Conn.

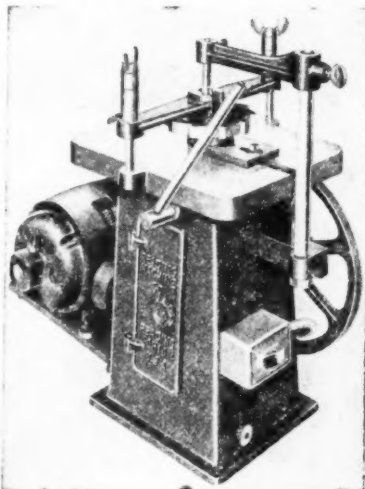
The founders state that the "Lost Wax Process" will be used, making possible the casting of small intricate parts to very close tolerances possessing high values of mechanical properties free from blow holes or porosity and machining time on small parts can be reduced by as much as 75% they claim. Time required for getting into production is rarely more than 20 hours.

Precision casting permits great liberty of design of intricate shapes, (undercuts, cavities, etc.) It permits the use of high strength, high heat resisting alloys, difficult to machine by cutting tools, and many units now requiring assembly can be cast in one piece.

FEDERATED METALS TRADE MARK

The Federated Metals Division of American Smelting and Refining Company, 19 Nassau St., N. Y. 5, New York, launched a new trade mark and slogan which points up the scope of the company's products, application-engineering work, research development, distribution network and technical-service facilities.

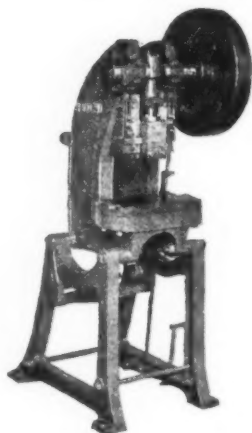
TO RAISE PRODUCTION CUT COSTS — THE READING BROACH KEYSEATER



The Reading Bench Machine does not require bushings or guides. No other machine like it. Very fast—capacity from $\frac{1}{8}$ to $\frac{3}{8}$ cutter. Low first cost—prompt delivery.

READING MACHINE CO.
READING (CINCINNATI) OHIO

MACO Punch Presses



No. 16—5 Ton

No. 18—Fabricated—8 Ton

No. 20—12 Ton

Specifications for No. 20

- ✓ Extra heavy construction
- ✓ Crankshaft, main bearing, 1-15/16"
- ✓ Crankshaft bearing, 2-1/16"
- ✓ Inclined
- ✓ Elevating screw

Machines built for the trade; on their exclusive merits, performance and durability, by

MICHAEL AMENDOLA & CO.
1059 Washington Avenue
Bronx 56, N. Y.

LODGE & SHIPLEY SALES CONFERENCES

The Lodge & Shipley Company's Machine Tool Division, Cincinnati, have recently acquired the turret lathe and hand screw machine division of the Acme Machine Tool Company, Cincinnati. In order to instruct and acquaint company representatives with details of the Acme turret lathes and hand screw machines, Lodge & Shipley have scheduled a series of conferences throughout the country.

J. Herbert Myers, director of sales and advertising and secretary of Lodge & Shipley is chairman of the arrangements for the conferences. William L. Dolle, president and general manager, plans to address each of the series of conferences, outlining how acquisition of the Acme turret lathe and hand screw machine rights enables Lodge & Shipley to be the only machine tool company in the nation offering a complete service in the machining of cylindrical surfaces: engine lathes, tool-room lathes, automatic lathes, turret lathes, contour-turning lathes, boring lathes, gap lathes and hollow spindle lathes in any combination.

Sales representatives from Harrington, Wilson & Brown, New York, headed by Dan Harrington, president, who represent Lodge & Shipley in the metropolitan New York area will convene in Cincinnati for the first of the series of weekend sessions.

STANLEY ELECTRIC TOOL MOVES

Stanley Electric Tools, Division of The Stanley Works, recently moved into its new, modern six-story building at 480 Myrtle Street, New Britain, Conn.

The new building provides additional space for manufacturing and assembling the portable electric tools in the Stanley Electric Tool and Stanley-Carter lines. General offices of the company are located on the street floor of the new building.

BUNELL REPRESENTATIVES

The Bunell Machine and Tool Co., Cleveland, builders of special machines and tooling, announces appointment of the following district representatives: State Machine Tool Co., 1441 North Third St., Milwaukee, Wis.; Herbert K. Baker, 3020 East Grand Blvd., Detroit, Mich.; Triplex Machine Tool Corp., 125 Barclay St., New York City.

CARBOLLOY REDUCES GUIDE RING PRICES

Noteworthy in an era of generally rising prices is the announcement made by Carbolloy Company, Inc., of Detroit, that prices of their cemented carbide standard guide rings have been materially lowered, reductions in the prices in the smaller quantity brackets of the rings ranging as high as 40% and even 50%. In the lowest quantity range, for instance (from 1 to 49 units), prices now run from 26¢ for the GR-1 ring to \$1.88 for the GR-10 ring; as compared with the former range of from 55¢ to \$3.52 for the same items.

The minimum prices of the GR-1 and GR-2 rings have been reduced from 18¢ and 16½¢ respectively to 13½¢ for either item. In addition, the quantity of standard guide rings required to earn the minimum price has been lowered from 3000 pieces to 1000 for all sizes of rings. Thus, GR-10 rings can now be secured in lots of 1000 or more at a cost of 98¢ each, instead of at the former price of \$1.18 per ring in lots of from 1000 to 1999—a saving of approximately 18%.

An improvement in the make-up of the GR-1 ring has also been announced, consisting of a reduction of the inside diameter and a slight increase in the outside diameter, thus providing more hard carbide metal and hence greater strength and longer service life.

RUTLAND TOOL OPENS CARBIDE SALVAGE DEPT.

The Rutland Tool Service, 13006 Greeley Ave., Detroit 3, Mich., announces the opening of a new department for the salvaging of tungsten carbide tipped cutters. This department supplements a complete tool reconditioning service for all types of high speed cutting tools rendered by the company.

FEDERAL PRODUCTS ENLARGES PLANT

Federal Products Corporation of Providence, Rhode Island has completed the addition of a modern three-story extension and also a third-floor to its main plant on Eddy Street. The original building which was of comparatively recent construction has been modernized in every respect.

The machinery from their Reservoir Avenue and Willard Avenue plants has been installed in the enlarged Eddy Street plant so that the entire organization is now under one roof.

The Willard Avenue plant is to be retained as a warehouse.

BANDED THRUST BEARINGS



REGULAR OR SPECIAL DESIGN TO 24" O.D.

We also make Thrust Bearings interchangeable with other manufacturers.

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SCHAUER SPEED LATHES

are production necessities in any plant, for economical, speedy finishing, polishing, de-burring or lapping small parts.

There is a size and type for your particular needs. For complete information

Write for Catalog 440

The Schauer Machine Co.

Originators of Today's Speed Lathes
2064 Reading Rd. Cincinnati 2, Ohio

NEW TECHNICAL BOOKS

MACHINE-SHOP ESTIMATING

By W. A. Nordhoff, *Machine-Shop Estimator, Douglas Aircraft Co., Inc.* 486 pages. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. \$6.00.

Material in this volume represents 15 years of collecting data through personal observation of men and machines at work. Mr. Nordhoff has worked for various manufacturers in and around the West Coast as a time study man. The value of the book lies in its simplicity of treatment. Indeed it is one of many wartime attempts by the Douglas Aircraft Co., Inc. to educate totally untrained workers in machine shop estimating as quickly as possible.

Science is the basis for evaluating the performance of machine shop operators, in terms of the time required to perform a job. Each chapter is devoted to operations generally pursued by any ordinary machine shop, among them turning, boring, facing, threading, tapping and grinding. Pictures and diagrams show the machines and tools clearly and a brief description of each operation is helpful in understanding problems and solutions. Problems are presented together with methods for arriving at reasonable time values for elements of operations.

Tables supply machinery elements which are generally variable, and sample estimates are shown for all machine operations to assist the reader in

doing his own estimating.

Phases of time study in the machine shop are thoroughly covered and understandably written.

CONCISE CHEMICAL AND TECHNICAL DICTIONARY

Edited by H. Bennett, *Technical Director, Glyco Products Co., Inc.* 1120 pages, 6" x 9". Published by Chemical Publishing Co., Inc., Brooklyn, N. Y. \$10.00.

Many people in the business world, bankers, brokers and manufacturers of all commodities, realize their lack of knowledge of various technical expressions freely used in newspapers, etc. Also in today's world of specialization, the technician is only slightly acquainted with terms used outside his own sphere of activity.

This dictionary contains 50,000 definitions covering fields of scientific and technical developments such as manufacturing processes, chemistry, biology, medicine, mathematics, etc. The general rules for pronunciation of chemical terms follow recommendations of the Nomenclature, Spelling and Pronunciation Committee of the American Chemical Society. A special feature is the listing of trade names or proprietary products in fields of plastics, metals, rubber, textiles, etc. Tables include conversion tables for weights, measures, temperature, range and use of indicat-

ors, organic ring systems, etc. The addenda lists new trade names and definitions of additional technical terms.

This is a handy reference book for individuals confronted with puzzling terms outside their own fields of specialization.

FINISHES FOR ALUMINUM

In two volumes, Section I wire bound, 108 pages, and Section II loose leaf binder type, 120 pages. Produced by Technical Editorial Service, Reynolds Metals Co., Inc., 2500 S. Third St., Louisville 1, Ky. Revised bulletins issued for Section II from time to time. \$2.00 for both volumes.

Aluminum offers many valuable and interesting combinations of surface finishes for enhancing its appearance. To indicate some of the important possibilities, these two volumes were published.

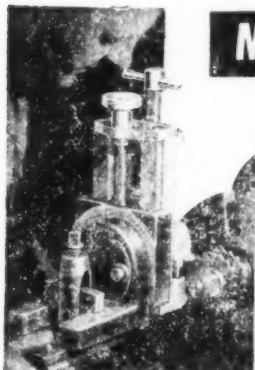
Section I discusses the many different types of finishes, their characteristics

and applications. There are listed 8 methods of cleaning—by hand, tank, acid, alkaline, vapor degreasing, high temperature, electrocleaning methods and cleaning prior to spot welding. Discussions on finishing methods include mechanical (buffing, grinding, polishing, etc), chemical (alkali, design and acid etching, heat treat stains), organic (brushing, spraying, painting,) electroplating, and special finishes (silk screen and sprayed metal).

Photographs of aluminum products are plentiful and well done. A discussion of various controls and tests for finishes concludes Section I.

Section II supplements the information in Section I with shop data on materials, equipment, solution preparation, procedure and control for more than 30 of the most widely used finishing processes.

These volumes supply to users of aluminum a complete and continuing service in the finishing field, and offer



**CONVERTS LATHE IN
10 SECONDS**

MILL IT...ON YOUR LATHE!

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MILLING ATTACHMENT

Now you can Mill, Slot, Grind, Groove, Square Shafts, Saw at Angles, Recess and many other important jobs. **SAVE TIME and MONEY!** Why send work out or use costly methods when a PALMGREN MILLING ATTACHMENT will solve your problem.

Precision built, it has accurate graduations for every angle adjustments, also graduated vertical feed screw. Fits South Bend, Adams, Craftsman, Logan, Sheldon, and all other lathes. Thousands now in use in small and large machine shops, repair shops, railroads, schools, home work shops, etc. **ORDER SIZE NEEDED TODAY!**—it will quickly pay for itself.

	Nos.	Width Inches	Depth Inches	Jaws Open	Weight Pounds	Fits Tool Post	Price F.O.B. Factory
IMMEDIATE DELIVERY	150	1 1/2	1"	1 1/2"	6 1/2	1 Dia.	\$18.75
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	400	4"	1 3/4"	4"	25	2 Dia.	39.75

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an effective means of keeping up with advances being made in this phase of aluminum processing.

PLASTICS MOLDS

By Gordon B. Thayer, B.S.E., Plastics Research Engineer, The Dow Chemical Co., with the assistance of Paul L. Reed, editor of Industrial Plastics magazine. Published by Huebner Publications, 2460 Fairmount Blvd., Cleveland 6, Ohio. 272 pages. \$5.00.

"Plastics Molds" in its third edition deals with the design, manufacture and use of molds. Compression mold types are classified for study; transfer and jet molding are described; injection molds are presented both as units and broken down into their elements of design and construction. Mold sinking, applications of mold base standards and molding of screw threads are examples

of detailed descriptions. A unique feature is the chapter devoted to enumeration of 149 Practical Points in Mold Design and Construction.

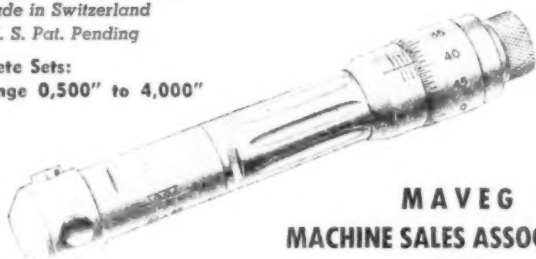
Factors which frequently are troublesome are elaborated upon and include descriptions of several types of ejector systems for injection molds. Mold sinking by hobbing, milling, the rotary head method, duplicating, along with equipment required are carefully described. Mold plating with hard chromium and the electroplating process are described in detail.

Finished methods and equipment, including tools, machines and accessories available take up an entire chapter. Plastic tooling, for which liquid casting resins are used, is described in detail as developed so successfully by the Curtiss - Wright Corporation. Another feature is the description of a semi-standard method for estimating the costs of plastics molds.

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T E S A
INTERNAL MICROMETER

Made in Switzerland
U. S. Pat. Pending

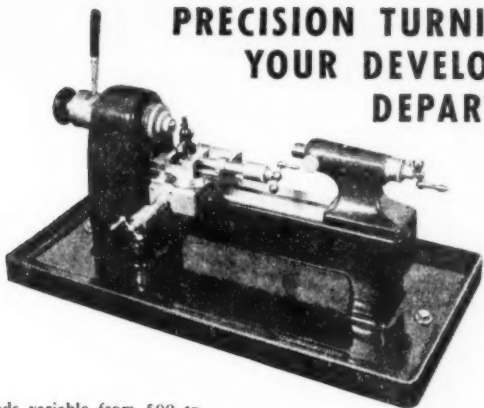
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High spindle speeds variable from 500 to 5,000 R.P.M. Built to perform the most delicate turning operations. Investigate now — It will prove an economy project in years of service. Representatives in principal cities of the United States.

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ENGINEERING & MANUFACTURING
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You can do any of these jobs **FASTER-EASIER-BETTER**

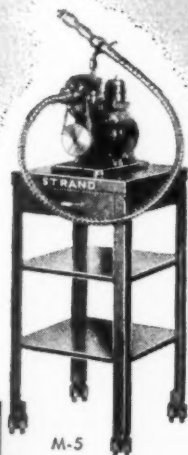
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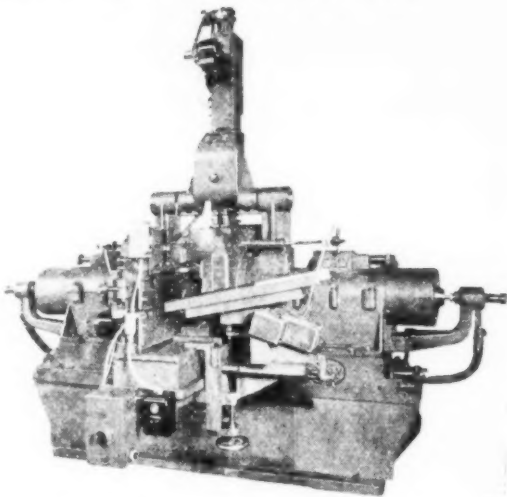
WHAT'S NEW IN METALWORKING

BESLY WET GRINDER SPEEDS WRENCH PRODUCTION

Charles H. Besly and Co., manufacturers of equipment for production grinding from the smallest pieces to large steel castings, have introduced a new-type Double Spindle Wet Grinder designed for grinding drop forged wrenches and other parts which require grinding of parallel surfaces.

The grinder features a combination magnetic vibrator and automatic chain feed especially arranged for fast, accurate feeding of parts thru the required cycle. Using oil as a coolant, the machine is capable of turning out 2400 wrenches per hour, measuring 8" overall, and ground on all four surfaces. Listed as No. 226, this 30" equipment is viewed as an improvement over double spindle disc grinders requiring hand feed to grind each end of the work piece separately. This process permitted production of only 600 finished wrenches per hour; to attain this figure, it was necessary to forego opening and closing the wheels, which quickly developed taper, and this taper was reproduced on the wrench faces. By the new method, wrenches from 2½" to 9" are guided straight thru the Besly grinder, and grinding wheel wear is evenly distributed. The wrenches emerge from the grinder flat parallel, close to specifications, which facilitates polishing.

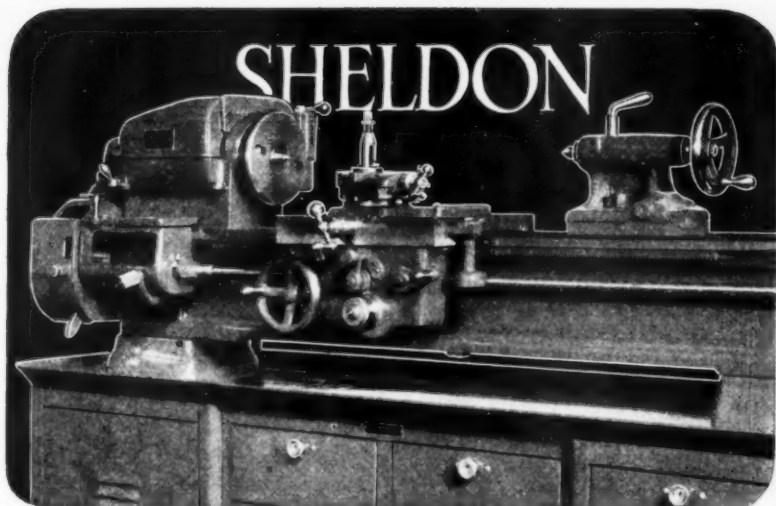
The cut shows the grinder with magnetic vibrator and automatic chain feeder especially arranged for grinding double



and drop forged engineers' wrenches. In feeding, the operator simply lines up the wrenches on the magnetic vibrator.

Specifications of the grinder include 4½" diameter spindles; the steel disc wheels are 30" in diameter x 1-1/16" thick. The grinding wheels are grain No. 60 wheels, 30" in diameter, 1" thick, with 1" hole. A power driven bar type truing device insures easy, accurate truing of the wheels when necessary. The Grinder itself is operated by two 25 hp motors. Net weight of the machine is approximately 12,500 lbs.

For further information regarding the Double Spindle Wet Grinder, No. 226, will be supplied by writing the Charles H. Besly Co., Dept. BB, 118-124 N. Clinton St., Chicago 6, Ill.



What do they say? We asked the users why they preferred the Sheldon S-56 Lathe. They said:

"It's rugged"—The bed is heavy, the bearings large.

"Large hole in spindle"—There's a $1\frac{3}{8}$ " hole thru the spindle.

"Collet Capacity" and "Extra Capacity"—It has 1" collet capacity and $1\frac{1}{4}$ " swing.

"The drive"—4-speed (8 spindle speeds) V-belt underneath motor drive, has double V-belts to the spindle that minimize power loss.

"It's really accurate, does real pre-

cision work"—Ways, lead screws, spindles, etc., are held to the very closest tolerances.

"The S-56 is big enough to handle most lathe jobs, still is low enough in price for my shop"—Only complete tooling and newly developed special machinery make it possible to build so fine a lathe at S-56 prices.

In the new TRB-S56 you get all this and in addition an even heavier headstock with "Zero Precision" tapered roller spindle bearings.

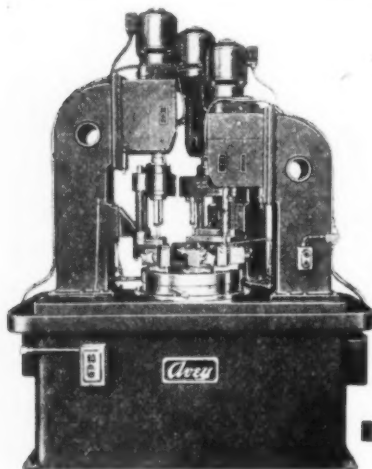
Write for circular

SHELDON MACHINE CO. Inc.

Manufacturers of Sheldon Precision Lathes • Milling Machines • Shapers
42 2 N. KNOX AVENUE • CHICAGO 41, ILLINOIS, U. S. A.

AVEY DRILLS HANDLE MULTIPLE OPERATIONS AT ONE SET-UP

The Avey Drilling Machine Co., Cincinnati, Ohio, is manufacturing adaptations of its Cam Feed Units, which are designed particularly for multiple operation



on individual holes—drilling, counter boring and tapping at one clamping of work. It is a self-contained unit with Avey electrical controls for operating and synchronizing multiple unit set-ups. Semi-skilled operators can deliver high quality production at a fast rate, accurately, and with little supervision.

Avey Cam Feed Units offer stepped-up production, obtainable by free loading time and multiple operations on several

parts simultaneously in the time required for one operation. This assures lower cost per part, as well as higher production per capital investment. Capacity for Avey Unit No. 1 is $\frac{1}{2}$ " in cast iron; for No. 2, capacity is $\frac{3}{8}$ " in cast iron. For complete information, Engineering Bulletin No. 645 is available free upon request to the manufacturers.

DOWEL PIN PULLER

The F. & H. Manufacturing Co., 10,338 Gratiot, Dept. BB, Detroit, Mich. have announced the release of a Dowel Pin Puller; it is designed in six sizes, $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", and 1". The contact between the puller and the dowel pin is accomplished by means of a ball and socket arrangement. The operation consists of placing the puller over the dowel pin and tightening the top nut; this releases the dowel pin, obviating the usual grinding of the pin in order to fasten the set screw to it.

ARC WELDING TORCH SUPPLEMENTS LINE

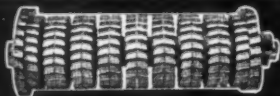
A "Knock-Out" Arc Torch has been added to the "Knock-Out" a-c arc welding equipment manufactured by the K. O. Lee Co. of Aberdeen, South Dakota. The firm reports that this new Arc Torch possesses several unique features, including a feather touch slide control which provides a fast make-and-break of the arc flame with a touch of the thumb. When the slide control is off, the torch is shock-proof, will not flash when set down, and is safe for adjustment or carbon replacement. The new accessory weighs only 1 $\frac{1}{4}$ lbs, is easy to handle, and uses $\frac{3}{8}$ " and $\frac{1}{4}$ " carbons interchangeably without adaptors. Further details may be obtained from the manufacturer, the K. O. Lee Co., Aberdeen, South Dakota.

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Send your cutting tools in today for Sharpening, Salvaging, Reconditioning

SAVE UP TO 70%

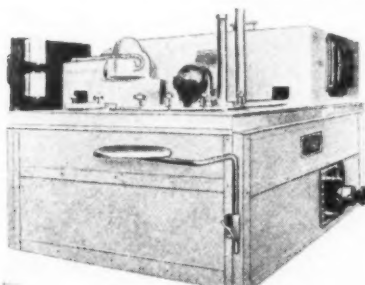
Rutland
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TOOL SERVICE
DETROIT 3, MICH.

WASHER HANDLES UP TO 3000 BALL BEARINGS PER HOUR

A new machine has been developed by the Mabor Co., for the processing of ball bearings, with emphasis on the difficult problem of cleaning the hidden areas of the races. The variable speed



conveyor of the equipment is a link chain affair, wound around a series of sprockets supporting vertical pyramidal holders which accommodate the ball bearings. The races are rotated continuously by means of the friction strap and the ec-

centric sprays which are directed between the two races. These sprays are actuated by two 2-hp pumps.

The equipment may be used with any spray treatment, utilizing up to three different sprays. From 1500 to 3000 ball bearings, in sizes up to 6" in diameter, can be handled per hour in the machine. Loading and unloading in some cases can be made automatic. A blow-off and dryer attachment can be furnished, if specified.

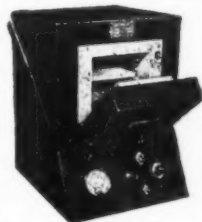
The solvents used are emulsion or oil base cleaners, such as kerosene or similar compounds to prevent the possibility of rust formation. The solvents are also continuously filtered to eliminate the return of abrasives which are damaging to the parts being processed. For additional information, and engineering data, write to the Mabor Co., Clark Township, Rahway, N. J.

We have two population groups, each of whose work supplements that of the other—those who till the soil and those who work with machines. The farmer provides the food and the machine worker provides the machines used to cultivate the food.

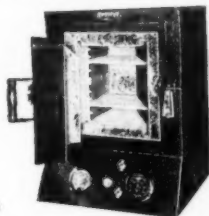
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Deluxe and Super- Deluxe Furnaces

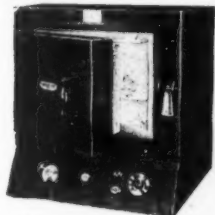
Standard models, with automatic heat control. These will be continued without change.



▲ **MODEL 7051**
Interior size—5½"x5½"x6"
Exterior size—15"x15"x17"
115 V.A.C. only—1.2 K.W.—\$123



▲ **MODEL 7053**
Interior size—8"x8"x10"
Exterior size—18"x20"x24"
24"—115 or 230 V.A.C.
3 K.W.—\$206



▲ **MODEL 7052**
Interior size—12"x12"x10"
Exterior Size—22"x22"x24"
230 V. A.C.—4.6 K.W.—\$286

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WRITE—For full information and
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DEALERS — Desirable territories
open. Write for our interesting offer.

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SEND US YOUR PRINTS FOR *Quotations*

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New STEEL INSPECTOR'S STAMPS



Faster
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Different borders may be used
for different shifts. Available
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today.

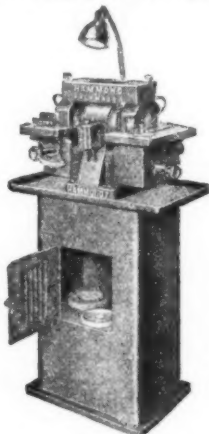
NEW METHOD STEEL STAMPS, Inc.

147 JOE CAMPBELL

DETROIT 7 U S A

HAMMOND CARBIDE TOOL GRINDER

The Hammond Machinery Builders announce the release of a new Carbide Tool Grinder. Designated as Model 7, the accessory is of sturdy construction thruout,



and is built purposely for heavy-duty work, providing vibrationless operation necessary for diamond wheel grinding. Its features entail 7" diameter cup wheels (providing 20% more grinding area and 20% more abrasive material than 6" discs), reducing wheel changes; both 6" and 7" wheels can be accommodated. The spindle and the bearings of the grinder are over-size, and one of the bearings is double row for taking end thrust.

The weight is 175 lbs. for the bench model, and 280 lbs for the floor type. The tables are 8" x 14", and may be set to any angle from 25° above to 30° below horizontal. The angle setting is accomplished by turning locking lever with one hand, while tilting the table to the desired angle with the other. Equipment includes quick-stopping brake, and a convenient reversing switch. Further information may be secured by writing to the Hammond Machinery Builders Inc., 1600 Douglas Ave., Dept. BB, Kalamazoo 54, Mich.

HANDY TRAY CLAMPS TO DRILL PRESS COLUMN

A utility tray that can be instantly attached or detached to fit the column of a drill press has been developed by the Lorenzen Industries. The trays are 10" x

**CUT UP TO 18 GAUGE MILD
STEEL WITH A FOOT-POWERED**

famco
**SQUARING
SHEAR**

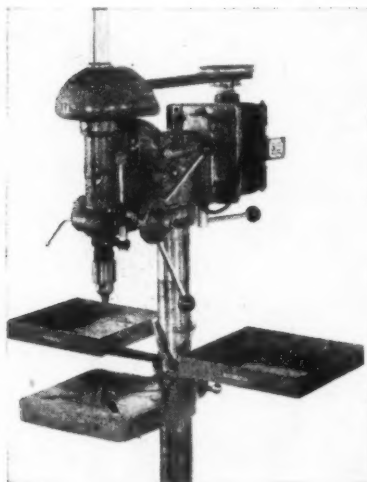
FAMCO MACHINE COMPANY • 1320 18TH STREET • RACINE, WISCONSIN

• Save on light shearing jobs without cutting quality. Famco Squaring Shears, built of semi-steel, accurately machined, do precision shearing of up to 18 gauge mild steel. Five cutting widths (22" to 52") have easy-to-set gauges. Write today for full details on the Famco line.

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ARMOR PRESSER • FOOT PRESSER • SQUARING SHEARS



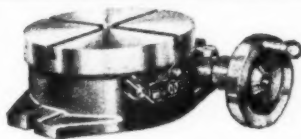
10", made of heavy gauge steel, welded at the corners, with an aluminum attaching



arm. Applicable for home workshops as well as factories, this handy accessory is useful for keeping small tools and parts readily accessible. By attaching two trays on opposite sides of the column of a drill press, one may be used to hold unfinished parts, and the other for finished parts, effecting a considerable saving of time on production lines. Write to the Lorenzen Industries, Dept. BB, Niles 5, Mich. for descriptive literature.

LOW COST PARTS CLEANER

A new low cost unit for cleaning dies and small assemblies between machining operations, is offered by the Gray-Mills Corp., makers of Agitor parts cleaning systems and Agitene solvents. Known as the "Agitor Jr.," the unit, having an average operating capacity of four gallons of solvent, is equipped for air-agitation and comes complete with a large basket and a small fine mesh basket for very small parts. It can be used as an independent unit or as an auxiliary unit on larger Agitor Cleaners used for general parts cleaning. The Agitor Jr., is supplied complete with four gallons of Gray-Mills cold cleaning solvent. Literature and full details on request to the Gray-Mills Corp., 1948 Ridge Ave., Evanston, Ill.



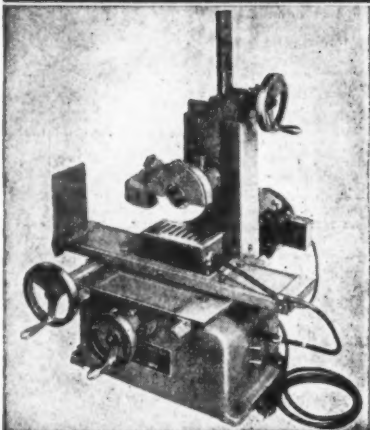
Troyke Rotary Tables
9" to 25"



Carroll Dividing Heads
6" to 12"

TROYKE MFG. CO., 4422 Appleton St., Cincinnati 9, Ohio

SANFORD



High-Speed BENCH SURFACE GRINDER

ACCURATE WITHIN .0001

A sensitive machine built to rigid standards of accuracy and workmanship specially designed "For the job that fits in your palm."

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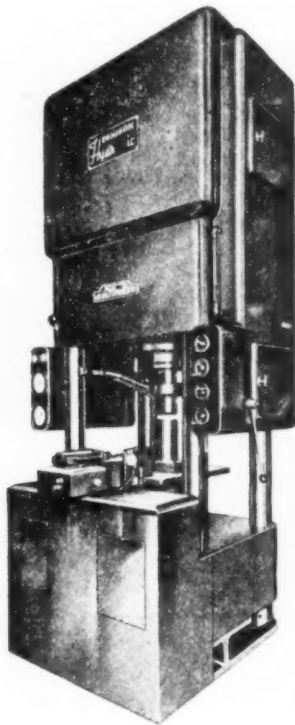
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Union, N. J.

75-TON DENISON MULTIPRESS

Varied ram action controls which have made smaller Multipress models such valuable production tools in industry are now available for the first time in a 75-ton Multipress. The "vibratory control" feature offers a wide range of ram actions and controls, unique in a press of this size. With a choice of three valve combinations, this new 4-strain-rod press will meet practically every pressing-cycle need within a 75-ton range.



Operating characteristics include automatic or manual ram cycling, fast traverse—slow pressing speed, pressure and distance reversal, low ram tonnage if desired with high return and accessory pressures, large tooling area, one-man operation, pressurized filter system, with

all operating controls at the operator's fingertips.

Simple adjustments give this press a pressure variance of from $7\frac{1}{2}$ to 75 tons, making it adaptable to a wide variety of different applications. The user can get manual or automatic "work-fit" control of every essential press cycle—advantages never before available in a press of this size.

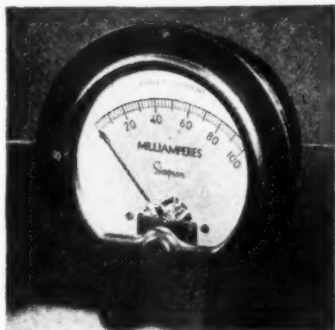
For complete information, write The Denison Engineering Co., Dept. BB, 1160 Dublin Road, Columbus 16, Ohio.

SIMPSON ILLUMINATED DIAL METERS

The problem of how to illuminate the dials of panel meters and similar instruments has been solved by the Simpson Electric Company, Chicago, Ill., manufacturers of electrical measuring instruments. Simpson claims that the new illuminated meter floods every fraction of the dial face with an even radiance, doing away completely with shadow spots.

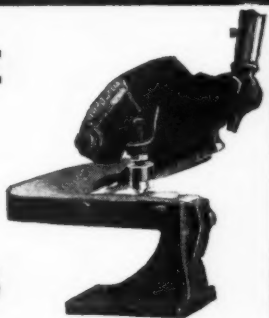
A Lucite cone carries the light from a recessed bulb in the back of the instrument thru the front edge of the cone

which entirely surrounds the dial face. This makes possible the use of the standard Simpson metal dial. Thus, the tendency of translucent dials to fade, discolor or buckle from age and heat is eliminated according to Simpson. Pointers cannot stick nor readings be distorted.



The new Simpson Illuminated Meters are available in 2" and 3" sizes, in both rectangular and round cases.

CUT ANY SHAPE BETTER with BEVERLY Throatless SHEARS

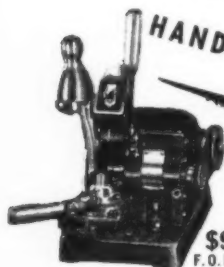


The No. B-3 BEVERLY Bench Type Shear with Ball Bearing Hold Down handles $3/16$ " or No. 10 gauge stainless steel. This sturdy shear weighs 58 lbs. and is equipped with H. C. H. C. Blades for heavy duty service.

Let us send Bulletins giving full details on the BEVERLY LINE —

THE BEVERLY SHEAR MFG. CO., 3005 W. 110th Pl., Chicago 43, Ill.

**IT'S PROFITABLE
to MILL SMALL PARTS
with this NEW *Rouse*
HAND MILLER**

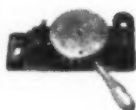


\$98 (Without Fixtures)
F. O. B. Chicago. Motor Extra

● Anyone can operate this high-speed motor-driven unit with speed and accuracy. It pays you extra profits in fast, low-cost finishing light cuts on aluminum, brass, steel and other metals . . . also, rounding and burring steel and cast iron. A handy machine for second operations on plastics.

With Rouse Fixture Set-Ups—the Rouse Hand Miller has added capacity for precision milling of a large variety of small parts for instruments, electrical work, aviation components, etc.

Rouse
**Fixture Set-Ups
that Speed
Production**



Immediate shipment can be made.

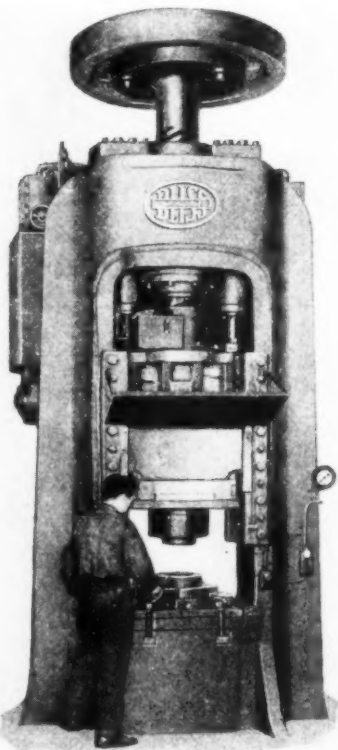
Write for illustrated folder and full details.

**H. B. ROUSE
AND COMPANY**

2214 N. Wayne Ave., Chicago 14, Ill.

BLISS PERCUSSION PRESS

A percussion press design, introducing hydraulic pressure for moving the slide, which facilitates rapid economical production of hot forgings, steel, brass, and aluminum in a wide range of shapes, has been developed by the E. W. Bliss Company, Detroit 2, Mich.



The operating principle of this 600-ton Hydro-Screw Press employs a flywheel at the top of the screw which is brought up to speed by hydraulic pressure and utilizes the accumulated energy developed to deliver a quick, hammerlike blow, uniform in power. On a 16" stroke under maximum power, the machine cycle is

completed within three seconds, start-to-return. Usually only a single blow is required to finish a part.

Power is adjustable and can be reduced by regulating the delivery of the variable delivery pumps. Continuous lubrication of the screw is maintained by means of a pump in the slide which provides a constant supply of oil at the top of the nut while the press is in operation.

For immediate reversal at rebound, the quick action valves reverse the motion of the hydraulic pistons. At the top position, the valves immediately lock the hydraulic pressure, preventing the slide or gate from drifting down.

For die setting, a push button control with selector switch is provided. During inching, the slide can be brought up or down in small degrees to enable quick, accurate die setting without danger of injuring the dies. No ratchets are required nor strenuous effort on the part of the operator.

An air operated lift-out in the bed and similar knock-out in the slide are controlled by limit switches operated by the slide.

Self-contained and constructed of cast steel, the Bliss Hydro-Screw Press is quiet in operation, rapid-acting and does

not require skilled help for maximum efficiency. It permits of ready and economical maintenance and contains no friction plates to be renewed.

The slide area is 25" x 27" and the bed area is 26" x 29". The press is equipped with one 40 hp.—1200 rpm motor and two Vickers PV-2050 pumps and has an 11" diameter, 12" lead, 4 thread screw. Fly-wheel speed is 115 rpm. with a K.E. of 21,000 ft. lbs. This type of press is available in three sizes, 400 tons, 600 tons, and 1,000 tons capacity.

NILSSON PLUG AND RING GAGES

Ring and plug gages, worn beyond tolerance size, can now be restored to their original dimensions thru a renewal service offered by the Nilsson Gage Company, Inc., Poughkeepsie, N. Y. In the restoring of worn gages, Nilsson applies Chrome, leaving approximately .0015 to .002 on the finished size. This minimizes cracking, breaking, increases service life from 4 to 6 times over ordinary hardened tool steel gages. High lustre and longer wearing quality are insured by lapping. Also, Nilsson is making delivery within 10 days on new ring and plug gages, within 24 hours on plugs in limited quantities.



SAVE HANDS WITH STRANDS

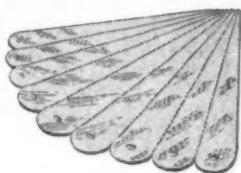
**SAFGUARDS
FOR PUNCH
PRESSES**

*Send for Enclosure
and
Sweep Safeguard
Circulars.*

STRAND MFG. CO., INC.
SAFETY ENGINEERS

607 West Lake Street Chicago 6, Ill.

wide blade selection



makes light work

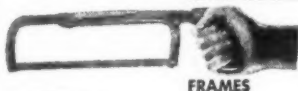
LIGHTEN the work by choosing the right blade for each job from your VICTOR supplier. He's got a full line of them—a VICTOR blade and frame for every job a hack saw or band saw can do. You can rely on VICTOR saws for the right kind of fast, clean cutting on metal, plastics, and other non-metallics, too... the kind that saves time and labor cost.



POWER BLADES



HAND BLADES



FRAMES



BAND SAWS
(Metal cutting,
including Skip-tooth)

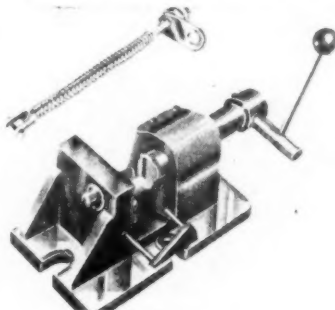
VICTOR

Victor Saw Works, Inc., Middletown, N. Y.
Makers of Hand and Power Hack Saw Blades,
Frames and Metal Cutting Band Saw Blades



ADAPTABLE MILLING FIXTURE IS JACK-OF-ALL-TOOLS

A versatile milling fixture which is primarily designed for production milling, and is equipped with interchangeable Anvils and Movable Jaws to accommodate a variety of sizes and shapes of stock has recently been released by Manufacturer's Engineering Service. It is also adaptable as a work holder for tapping, drilling, burring, etc. The tool is designated as the Kam-Grip Milling Fixture. Each fixture comes equipped with a Lock



and-Release Rod, and two sets of Anvils and Movable Jaws to accommodate round, hexagon and square stock.

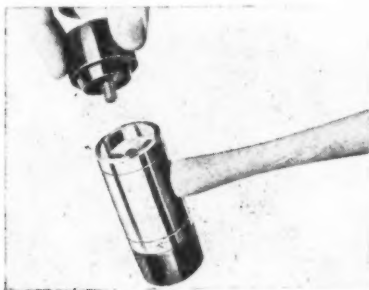
The fixture may be operated either manually, or by a simple attachment of the Lock-and-Release Rod from the Cam-Lock Arm to the drill press, may be locked to the drill press spindle on many operations. The assembly may be swung an entire 360° for left or right hand operation, or in top or bottom position. Catalog folder with complete specifications will be furnished upon request to the Manufacturers Engineering Service, Inc., 415 Security Bank Bldg., Toledo, Ohio.

NEW PLASTIC HAMMERS HAVE REPLACEABLE TIPS

Replaceable hammer tips of three grades of hardness are features of the Nupla Hammers, introduced by the New Plastic Corp. These tips are stamped "soft", "medium", and "hard", in order that the operator may select the exact hardness for a particular job. If desired, two tips of different grades may be used on the hammer at the same time, and a third is substituted simply by spinning the tips on or off; the tips are held firmly by a patented locking device. These replaceable tips are also an economy feature,

since the life of the hammer may be extended by the inexpensive replacement of one or more new tips, according to the manufacturers.

The Nupla Hammer has little rebound or sting, features which reduce operator fatigue, while adding to the tool's accuracy. The tips are composed of a "live" material called Nupaflex, which is extremely resilient; they are also chip-proof, non-explosive, and will not flash burn. They are supplied with non-spark sleeves of aluminum alloy. The handles are made of seasoned hickory.



The Nupla is designed as an all-purpose hammer, to be used wherever a soft faced hammer that will not mar, scratch, cut or bruise is indicated. It is available in five sizes and ten weights. Further information may be obtained by writing to the New Plastic Corp., 1017 N. Sycamore Ave., Los Angeles 38, Calif.

NEW METAL PARTS CLEANSER

Faster and more thoro stripping of carbon, paint, varnish, oil and grease from metal parts is accomplished with a new cold tank cleaner, according to the manufacturer, Turco Products, Inc., 6135 So. Central Ave., Los Angeles 1, Calif.

In comparative tests, this new cleaner, called Turco Transpo, has been shown to clean at a rate which permits a quantity of parts to be stripped of foreign matter in a limited time. Transpo is effective at room temperature, preferably between 65° and 85°F. It is non-inflammable, and virtually odorless, thru a liquid seal which also extends the life of the compound. The cleaner is non-corrosive to aluminum, magnesium, cadmium plate, steel, zinc, cast iron, and tin-plate. The solution has long tank life, and replacement is necessary only for the nominal loss due to drag-out. Further information may be obtained by writing to the manufacturer.

ARGUTO OILLESS BEARINGS

USED

ALL OVER THE WORLD

... IN MANY DIFFERENT APPLICATIONS

"OUTWEARS THE BEST BRONZE METAL"

20 years



without
a drink—

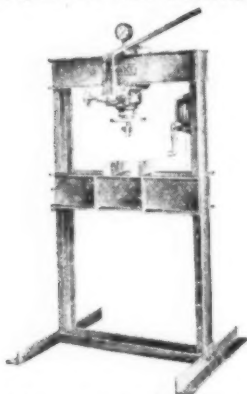
ARGUTO OILLESS BEARING CO.

WANE JUNCTION

PHILADELPHIA

DAKE 25-TON HIGH SPEED HYDRAULIC PRESS

A new 25-ton hydraulic press, designated as model 25H, is announced by the Dake Engine Co. This accessory meets



the need for an intermediate size press; it complements the numerous Dake Presses available up to 75-ton capacity. It is built

for use in maintenance, service, and industrial plants requiring a 25-ton hydraulic press. The model 25H features a fast-moving ram which saves considerable operating time over previous models of this type; the increased speed of operation is obtained by using an extra-large pump.

The press is constructed of arc-welded steel channel, reinforced thruout. A wide space between uprights allows the handling of work up to 33½" in diameter. The screw-type ram provided can be advanced quickly by hand to speed operation. Standard equipment includes two combination table and V-blocks, round nose for pressing, and with or without pressure gauge, and table-hoisting mechanism. Additional information will be furnished by the Dake Engine Co., Grand Haven, Mich.

RAPID ACTION SPRING TENSION CLAMP

A new spring tension clamp that can be applied in much less time required for screw clamps has been developed by Aircraft Tools, Inc. These accessories are effective for wood, plastic, or metal fabrication, template layout, and wherever uniform pressure and speed in applying and releasing are factors. They have practical uses in every type of manufacturing, including light welding, sheet metal,

MILLING — BURKE — MACHINES —

Put Your Small, Difficult Work ON A PRODUCTION BASIS!

- Burke Milling Machines are fast, economical and indispensable in shops handling small, difficult work.
- 4 Types TO MEET YOUR REQUIREMENTS — Nos. 1, 2, 3, and 4.
- Motor Driven for Fast, Economical Production.
- Timken Roller or Ball Bearings to Spindle.
- A Number of Attachments Available: Vertical Milling Attachment; Index Centers; Vises—3 types, including swivel base.



WRITE FOR COMPLETE INFORMATION

BURKE MACHINE TOOL CO. 510 Sandusky St., Conneaut, O.

**PLANT
Maintenance
Engineers
...SAY...**

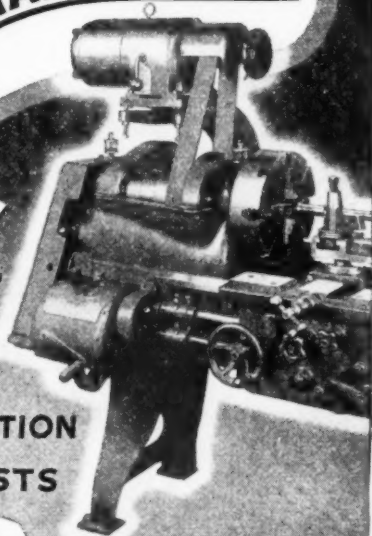
**LIMA Gearshift Drives
REQUIRE LESS
ATTENTION AND
LESS MAINTENANCE**

REMEMBER...

SELECTIVE SPEEDS with
**LIMA Gearshift
...Drives...**

**UPS your PRODUCTION
DOWNS your COSTS**

CAPACITIES..



SINGLE PHASE
½ hp and ¾ hp
POLYPHASE - ½ hp to 20 hp



THE LIMA ELECTRIC MOTOR CO.

254 FINDLAY ROAD

LIMA, OHIO

REPRESENTATION IN MOST PRINCIPAL CITIES

LIMA GEARSHIFT DRIVES

LIMA PEDESTAL GRINDERS - LIMA ELECTRIC MOTORS





**GIVE THIS VALUED HAND
THE BEST OF TOOLS**

**Increase Production
on Hand Operations
with Technite Hand
Hack Saw Blades.**

When you invest in payroll, help the worker produce more by handing him a hand hack saw blade that cuts faster. Capewell's *Technite* blade is especially designed to bite into "high speed" alloy steels. For sawing hard-to-cut automotive steels that industry has found Capewell the outstanding blade.

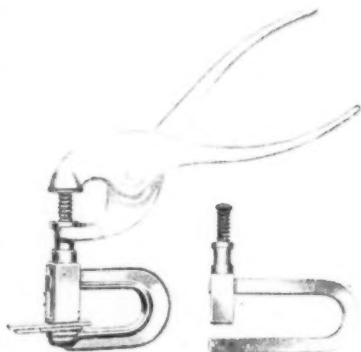
The same goes for Capewell's power blades. Ask our Distributor to tell you all about it.

**THE CAPEWELL MFG. CO.
HARTFORD 2, CONN.**

METAL WORKING CRAFTSMEN FOR OVER 65 YEARS

plastic, and similar industries.

Applicable with either pliers or gun, one advantage of these spring tension clamps is the uniformity of pressure which they insure. Using a special steel spring, the clamp may be adjusted to secure up to 70 pounds pressure, and pressure up to 100 pounds may be had by the use of a special spring.



The clamps are available in three standard sizes, and may be ordered in special dimensions to fit requirements. For additional information, write to Aircraft Tools, Inc., Dept. BB, 2306 E. 38th St., Los Angeles 11, Calif.

ARO HEAVY DUTY DRUM PUMPS

A new line of air-operated heavy duty drum pumps designed for the requirements of factories, contractors, and other large volume users of motor oil and lubricants, is announced by the Aro Equipment Corp., Bryan, Ohio.

Aro Pumps will handle lubricants, oils, paints, and other compounds direct from original containers of 55 gallons capacity; their use makes the handling of materials from original drums a simpler and more efficient operation, since they operate on a minimum of compressed air. The pumps are available in drum cover types for full opening drums, and in bung-bushing types for mounting in drums equipped with 2" bung-hole. Both types are offered in seven pressure ratios, from 40 to 1 to 2 to 1, for any material requirement. The manufacturer is one of the largest producers of lubricating equipment, and is well-known also for its line of Aro air tools.

New NESTING TYPE TOTE PANS



20" Long x 12"
Wide x 6 1/4" Deep
16 Ga., drag holes,
handles both ends.

J. L. LUCAS & SON, INC.
BRIDGEPORT 5. CONN.

NEW FORRESTER ALLOY SPRAYER

The Forrester Alloy Sprayer, manufactured by K. & F. Metal Spray Industries, is an all electric unit, using a-c or d-c current. The air requirements are 3 1/2 cu. ft. per min. at 30 to 40 lbs. pressure. Temperature control is adjustable from 100° to 600° F., and is maintained within 1/10 of a degree. The unit is securely sealed within a brass shell; the ni-chrome wire of the heating units is imbedded in a special refractory material completely encased in a sheath of high temperature chrome steel.

The only setting up operation requires plugging in the hose to the air pressure line. The alloy to be used is dropped into the pot, and the cover locked down. The gun heats quickly, and the metal melts in from 2 to 10 minutes. Spraying is accomplished by pressing the button on the handle. Metal can be deposited to a thickness of 1/4" over a 4" x 6" area in less than 60".

This unique sprayer is available in three sizes, with a 6, 12, or 24 cubic inch pot capacity. Models are manufactured in horizontal or vertical types, depending on

Topflight Tape LABELS

== APPLY INSTANTLY ON METAL ==

- INSTRUCTIONS -
- MESSAGES -
- CODES -

TOPFLIGHT TOOL CO. INC.
YORK, PENNSYLVANIA



requirements. Further information can be supplied by writing to the K. & F. Metal Spray Industries, Dept. BB, Detroit, Mich.

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

Write for Circular
NIELSEN TOOL & DIE COMPANY
1962 W. Eleven Mile Road,
Berkeley, Mich.

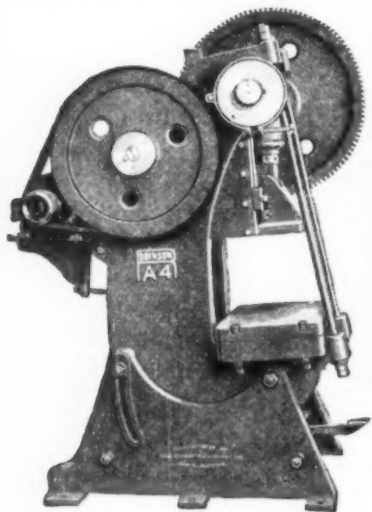


ABRASIVE CENT-R-LAP TOOL

Saves time, eliminates diamond dressing. Cones changed in seconds. Available in 2 sizes 3/8" and 3/4" Cent-R-Laps and abrasive Cones.

Write for descriptive literature and prices.
J. R. Reich Manufacturing Co.
45 E. Stroop Rd. Dayton 9, Ohio

Long Recognized for durability strength and service



● The new improved Series A Robinson Punch Presses retain all the sturdy characteristics of their predecessors with added safety, speed, strength and ease of operation and maintenance. Available in five sizes.

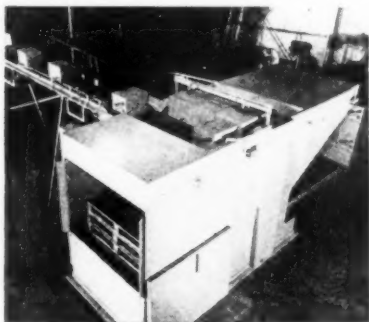
Send for descriptive Bulletin No. 7.

New Albany Machine Mfg. Co.
New Albany, Indiana, U.S.A.



AUTOMATIC PALLETIZER FOR CONVEYOR LINE

The Palletizer manufactured by Production Aids, Inc., North Hollywood, Calif., is a machine which automatically loads packages from a conveyor line on to empty pallets, and cross-ties the packages to make a complete compact pallet load ready for a lift truck. The machine is automatic, and includes automatic safety provisions. Thus, if the operator forgets to load the pallets into the Palletizer or the pallets run out, the machine will automatically stop.



The machine is so designed that by the addition of an automatic selector switch, the operator can select any one of seven stacking arrangements. The Palletizer can, by means of this single switch, handle the standard types of cartons. Any additional stacking arrangement can be obtained to cover individual applications by removing one control section and inserting an additional control section.

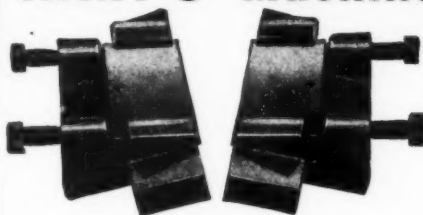
CARBIDE DRILL UTILITY KIT

A new Utility Kit, containing the six most popular sizes of Willey's new masonry drills, has just been announced by Willey's Carbide Tool Co. of Detroit.

All drills are tipped with Willey's Metal, almost as hard as a diamond. They drill clean, accurate holes in brick, cement, tile, asbestos, wallboard, marble, carbon, slate, limestone and plaster. They may be used in any portable, rotary drill—on a drill press—or with a hand brace. The handy Utility Kit of six drills, from 3/16" to 3/8" diameter, is complete with snap-fastened compartmented roll of heavy canvas.

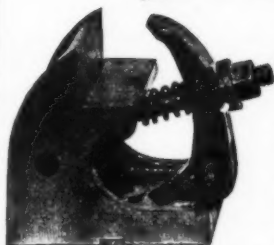
Further information may be had from Willey's Carbide Tool Co., 1340 W. Vernor Highway, Detroit 1, Mich.

HART'S Machine Vise Jaws



These Jaws are useful on any machine table. The angle holding the work down. Suitable to clamp or bolt to table. The hardened tool steel jaw measures 3"x6"x1½", the angle edge serrated.

HART'S Milling Fixtures



These fixtures will make themselves popular and profitable in your shop. Easily kept clean to receive the work. May be used in either horizontal or vertical position. Suitable to hold round, hexagonal, octagonal, or square stock, aligning the work with the machine. Grip holds the work on the bottom as well as on the back. Shipped in pairs, unless otherwise ordered. Made in 4 sizes—to hold stock from ½ to 5 inches.

HART MACHINE CO.

26 MATHER ST., DORCHESTER, BOSTON, MASS.

When writing for descriptive circular kindly mention the BLUE BOOK.

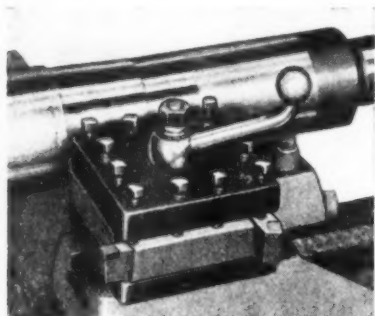
DRILL JIG BUSHINGS



WRITE FOR FREE CATALOG!

ENCO DESIGNS LeBLOND TOOL POST TURRET

A new Tool Post Turret, designed especially and adapted as standard equipment for the LeBlond Dual Drive Lathe, has been announced by the Enco Manufacturing Co., Chicago, makers of Tool



Post and Tailstock Turrets and Hexturrets. The new accessory, known as Model L-4½, offers extreme rigidity for carbide tipped tools which are supported

by a flat base and clamped with at least three screws. The maximum tool size for this model is ⅝" x 1".

A quick set-up for threading is provided by the twelve stations, with 30° indexing. Each tool mounted has three different working positions, and may be used for more than one operation. The indexing process is rapid and simple, since an equalizer spring keeps the tool block and clamping lever in constant contact, eliminating chip interference.

MANUFACTURER CLAIMS TUBULAR STRUCTURE IMPROVES MICROMETER ACCURACY

Advanced measuring accuracy thru tubular structure is a feature of the new Tumico micrometers, manufactured by the Tubular Micrometer Co., St. James, Minn. Structural weight has been cut up to 50%, offering greater freedom of movement with lighter "touch" and "feel", improving precision measuring, with less operator fatigue. Other features, include a wear take-up spindle bushing assembly which compensates for frame wear. The tubular micrometer has three points of take-up, on the spindle, at the tip, and on the thread, enabling the user to keep Tumico micrometers in constant precision

HIGH SPEED SIDE MILLING CUTTERS AT CUT PRICES



Diameters

3" to 8"

Widths

1/16" to 1"

Hole

1" to 1½"

Prices

\$4.80 to

Immediate
Delivery

\$39.46

Eastern Tool Supply Co., Inc.
178 Grand St. New York 18, N. Y.

HAND TAPPING with MACHINE PRECISION



\$52.50

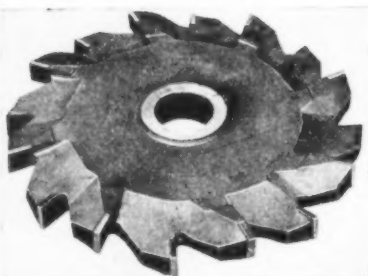
F.O.B.
MINNEAPOLIS

Anyone can operate a Dahlstrom Tap Guide. Just fasten it to a post, slip a Tap Adaptor into the spindle and turn the handle. Cuts tap breakage down to zero. \$52.50 F.O.B. Minneapolis, including 7 Adaptors. At mill supply houses, or Dahlstrom Mfg. Co., 416 South 6th St., Minneapolis 13, Minn. ASK FOR CIRCULAR.

Dahlstrom TAP GUIDE

CARBIDE TOOL SALVAGING PROGRAM

Due to the high original cost of carbide tipped tools, an announcement of interest to all manufacturers using these accessories, has been made by the National Tool Salvage Co., 6511 Epworth Blvd., Detroit, Mich. They have expanded their department for the salvaging of tungsten carbide tipped cutters.



Although this firm has handled this work in the past, it has now improved existing facilities and added more specialists to its staff. Work involving most types of salvaging from the resharpener of cutters or replacement of a broken tip to the complete alteration of cutters

for other operations is performed.

Because of the initial expense, scrapping or replacement of carbide tipped tools must be considered as a last resort. Many firms as a result of studying the possibilities of salvaging have found it possible to use carbide to replace high speed and have instituted regular salvage programs. However, many shops are not equipped mechanically or do not possess the necessary skilled personnel to undertake this work, or else they regard it as a specialty in its own right.

A catalog has been prepared that illustrates the possibilities of carbide resalvaging of milling cutters, drills, reamers, and special cutters of all types in the side and end cutting categories, as well as centerless grinder rest blades.

DRAWING INSTRUMENTS OFFER UNUSUAL FEATURES

New features and advantages are embodied in an industrial drawing set introduced by Charles Bruning Co. Inc. The instruments in the set consist of a Beam Compass with 8" and 13" beams, a 6" Bow Compass, a Ruling Pen, and a Draftsman's Refillable Pencil which may be converted into a double point pencil.

An exclusive patented feature of the Beam Compass is the rapid and positive adjustment of the needle and pencil blocks on the beam; a slight pressure on the tension spring of the blocks allows the needle and pencil blocks to move freely and smoothly on the beam, yet release of pressure locks the needle and pencil firmly in position. The accompanying accessories in the drawing set all have patented improvements.

The new Bruning instruments are of high quality, constructed of satin-finish aluminum, chrome-plated steel, and high-grade spring steel; it is assembled in a mahogany case. Address all inquiries to Charles Bruning Co., 4754-18 Montrose Ave., Chicago 41, Ill.



DIAMOND TOOLS

Diamonds vary in quality and it is important to use the proper kind for a given job. "Bargain diamonds" are not an economy.

If you don't know diamonds know your diamond dealer. Our 45 years in this field merits your confidence.

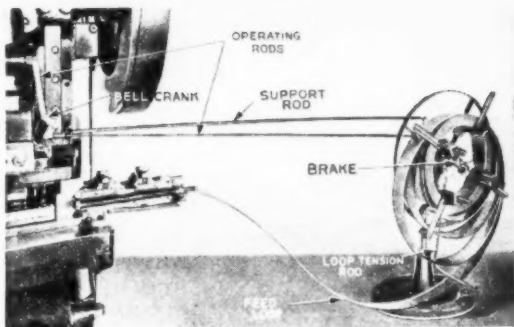
ACME DIAMOND TOOL CO.
15 MAIDEN LANE, NEW YORK, N. Y.



DICKERMAN AUTOMATIC STOCK REEL

The Dickerman Automatic Stock Reel has been developed by the H. E. Dickerman Mfg. Co., for use in the stamping industry.

The reel is adaptable to any type of punch press, and is automatic, in that it unreels stock from either the top or bottom of a coil at a controlled rate as required by the die being fed. Power for operating the reel is obtained from the press, thus it requires neither electric motor nor a gear reducer. A spring loaded feeding pawl, actuated by the press thru a simple bell crank and tie rod arrangement, engages a rack gear which is a fixed part of the reel hub. On the up stroke of the press the pawl is cocked or moved to a position of engagement with the rack gear; on the down stroke of the press the pawl is returned to its original position by means of the heavy, shock absorbing tension spring, causing the reel to rotate.



Control of unreeling is accomplished by means of a brake, and a pawl lifter. Over-running of the reel is prevented by the spring loaded friction brake located on the reel hub, while the amount of unreeling is governed by the tension of the stock loop which causes the pawl lifter either to lift the pawl free of the rack gear or allow the pawl to engage the rack

For EASY Adjustment

Specify

COMPACT DESIGN

HIGH TORQUE

HIGH-RATIO LEVERS

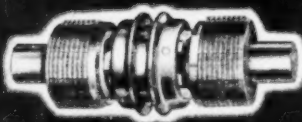
POSITIVE NEUTRAL

PRECISION BUILT

LONG WEAR LIFE

EASY ADJUSTMENT

ROCKFORD
PULLMORE



MULTIPLE-DISC
CLUTCHES

One-point adjustment, by hand, of ROCKFORD Multiple-Disc CLUTCHES is simple, easy and ample to maintain uniform operating conditions under long, hard usage. Unaffected by centrifugal force, PULLMORE clutches are convenient to operate and are positive in driving, braking and neutral action.

Send for This
Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains



diagrams of unique applications, Furnishes capacity tables, dimensions and complete specifications.



ROCKFORD CLUTCH DIVISION BORG-WARNER

1309 Eighteenth Avenue, Rockford, Illinois, U. S. A.

Bond

SPEED REDUCERS



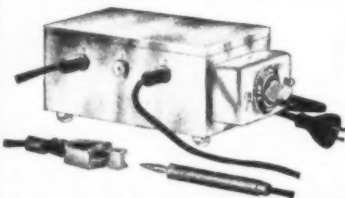
are used as integral parts of Stokers, Paper Box Machinery, Elevating and Hoisting Apparatus and many other applications where speed must be reduced.

Descriptive literature covering the many sizes and ratios gladly sent on request.

CHARLES **Bond** COMPANY

617-623 Arch Street, Philadelphia 6, Pa.

LUMA Standard Etchtool



A rugged tool built for long hard service and a wide variety of work. Many in use for more than 10 years. Etches hardened steel as fast as you can write. Dial control of heat . . . High, Medium and Low. Write for details.

9 Stages
of Marking
Control
•
From Light
to Extra
Heavy

Luma Electric Equipment Co.
P. O. Box 132-H Toledo 1, Ohio

gear and rotate the reel. Mounted on a large diameter base for stability, the stock reel is adjustable vertically to suit the height of press and also adjustable to accommodate wide range of stock coil diameters and widths. Additional information will be furnished upon writing to the H. E. Dickerman Mfg. Co., Dept. BB, 321 Albany St., Springfield, Mass.

HIGH-VACUUM FURNACE

For the heat treatment of materials which are highly reactive toward gases, a new high-vacuum furnace has been developed by Eitel-McCullough, Inc. Capable of continuous operation at temperatures in the 1800 C region, the standard type consists of three chambers integrated into a single enclosed unit. Cycling circuits are incorporated so one chamber can be in the treatment phase while one is under preliminary pumping and the third is being reloaded. Heating of the furnace is accomplished by large-diameter tungsten elements which involve low voltage. This minimizes ionization problems which are particularly troublesome in induction-heated vacuum furnaces and permits a very rapid approach to full temperature.

Each chamber of the furnace is equipped with a high-speed oil diffusion pump capable of maintaining high vacuum during the most difficult outgassing operations. Safety devices are provided to protect furnace parts against temperature extremes and the heating filaments against temperature extremes and the heating filaments against burnout from operation at too high a gas pressure. Program timers control the operating cycle and provides a means for presetting the treatment routine.

Consuming a total of 15 kw of power, the three-chamber unit has a total treating capacity of 175 cu. in. Cycling frequency, of course, is a function of the nature and amount of material and treatment time for each load (variables handled automatically within the cycle) plus intermediate time variables involved in the drop from operating temperature, breaking of the vacuum, and reloading.

Work to be treated is ordinarily handled in molybdenum containers which are inserted and removed from the furnace chambers fully loaded for rapid processing. Where a wide variety of work is to be handled, separate containers can be used for each type of treatment—reducing contamination from one to another. The furnace is manufactured by Eitel-McCullough, Inc., 1570 San Mateo Ave., San Bruno, Calif.

ERRINGTON MECHANICAL LABORATORY

MAIN OFFICE AND WORKS: STATEN ISLAND 4, NEW YORK

Chicago Office:
6701 N. SIOUX AVENUE

New York Office
170 BROADWAY

CLUTCH OR CONE DRIVE

*Our High Speed Tappers
are Super-Sensitive for
Small Tapping*

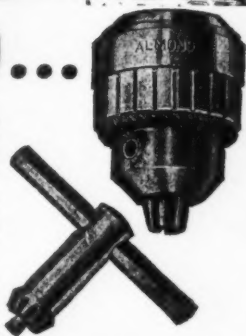


Style D-E, Quick Change Tools

ALMOND... *Triple Jaw* DRILL CHUCK

The Almond Three-Jaw Drill Chucks were pioneers in the field of drill chucks. Since 1872 they have played a necessary part in the logical procedure of machine developments.

Almond Chucks are furnished in nine sizes with capacities from 3/16 to 1". They are made for heavy and light duty types with taper or threaded arbor hole — to fit all machine tools and portable tools.



Write for complete details.

**The Original
Manufacturers
of Drill Chucks**

T. R. ALMOND CO.
ASHBURNHAM, MASS., U.S.A.

When Writing Advertisers Please Mention MACHINE and TOOL BLUE BOOK



CLOSED

TRADE

CLOSED
MARK

OPEN

Plain Type

Offset Type

CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

**AUTO MOULDING
& MFG. CO.****1110 E. 87TH ST.
CHICAGO 19, ILL.**

SPECIFICATIONS:
Open Width $\frac{1}{8}$ " to 6"
Gage Material .040 to .125
Pin Diameter .101 to $\frac{1}{8}$ "
Lengths to 120"

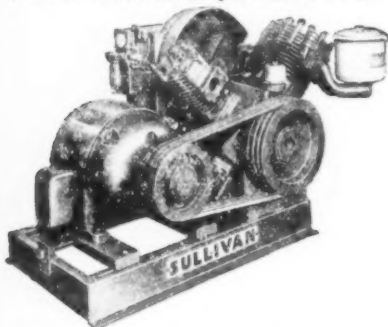
THREE-FOURTHS OFFSET

SEMI-OFFSET

SULLIVAN "UNITAIR" COMPRESSORS

A complete new line of two-stage, air-cooled stationary air compressors has been announced by the Sullivan Division, Joy Manufacturing Co. These "Unitair" compressors are available in nine sizes with power requirements ranging from 15 to 100 hp, and piston displacements from 81 to 590 cu. ft. per minute at 100

Because of their compactness and vibration-free operation, Unitair Compressors require a very small foundation. Installation of water pipes for cooling is eliminated, as these units are completely air-cooled. They have a wide application as a compressed-air source for small plants and in foundries, or for stand-by service.



The three standard electric drives include built-in motor, direct-connected motor, and V-belt drive. Unitairs may also be equipped for use with gasoline or diesel engines.

Outstanding features include: force-feed lubrication thru rift-drilled oil passages by means of a positive, gear-driven pump, "cascade" oil cooling to reduce oil consumption and sludging, low-life, large port-area, direct concentric valves for efficiency, low piston speeds for long life, and oversize ball-type main bearings for low maintenance.

lbs. discharge pressure psi, bases on 60 cycle motor speeds.

Further details may be obtained by writing for bulletin GG-5A. Sullivan Division, Joy Manufacturing Co., Oliver Bldg., Pittsburgh 22, Penna.



A REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long sought—a more accurate and surprisingly faster way of transferring blind screw holes.



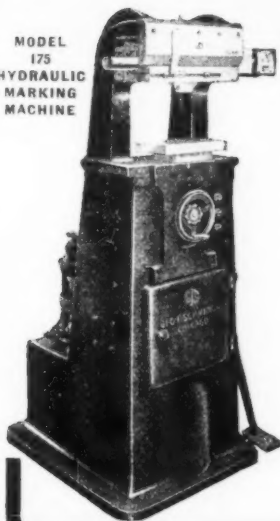
The Heilmann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in $\frac{1}{8}$ " to 1" diameters. Send for pricelist.

HEIMANN MFG. CO.

332 Lincoln Ave.

Urbana, Ohio

MODEL
175
HYDRAULIC
MARKING
MACHINE



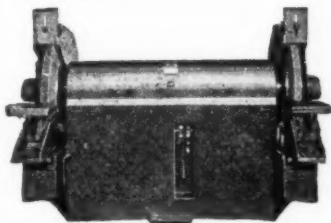
MARK IT for MARKET

Modern Marking Machines now enable most manufacturers of metal components to identify their products at trifling costs. TRADE MARKS — MANUFACTURER — PART NUMBERS PERMANENTLY ROLLED ON YOUR PRODUCTS will help you market them.

Send prints of parts, showing required marking and its location on part with hourly production for free recommendation.

Write for Catalog

GEO. T. SCHMIDT, INC.
1802 W. Belle Plaine Ave.
Chicago • 13 • Illinois



Cutting Speed . . . Always Constant

Through automatic control, the Marschke Vari-Speed Grinder assures correct rim speed and accounts for maximum metal removal at minimum abrasive cost.

Constant cutting speed is maintained through a pair of variable speed sheaves linked with the wheel guard adjustment so that spindle speeds are automatically changed when guards are reset to follow

the wheel wear. This machine may also be equipped as a Multi-Speed Grinder, thus giving a choice of three speed changes.

Both Marschke Grinders are designed and constructed for years of trouble-free service. They are made for wheel sizes ranging from 20" to 30" diameter and up to 4" widths, driven through multiple strand V belts from 20 HP to 40 HP motors.



VONNEGUT
BRUSH BACKED
SANDER HEADS



VONNEGUT
ELECTRIC
MOULDERS



MARSCHKE
GRINDERS
& BUFFERS

VONNEGUT MOULDER CORPORATION

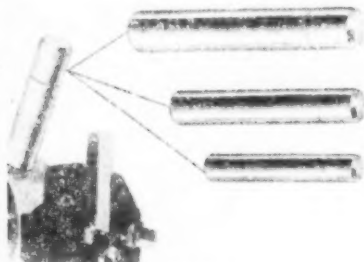
1809 MADISON AVENUE • INDIANAPOLIS 2, INDIANA

When Writing Advertisers Please Mention MACHINE and TOOL BLUE BOOK

305

REVOLVING STOP INCREASES ECONOMY ON SCREW MACHINES

The Boyar-Schultz Corporation has perfected a new development for use on screw machines, eliminating the necessity for the operator making his own stock stops. According to the manufacturer, the



Boyar Schultz Revolving Stop is an economical accessory, since it incorporates a free turning, ball bearing head, which reduces the incessant friction between the work and the stop, thus preventing the marring and damaging of piece parts. It is precision made from hardened, selected

steel, and is designed to stand up under heavy usage. Its enclosed ball bearing races prevent the entrance of metal chips and other foreign material, assuring longer life. Complete information will be supplied by writing to the manufacturers, the Boyar Schultz Corp., 2110 Walnut St., Dept. BB, Chicago 12, Ill.

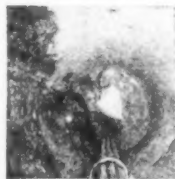
STAR LIVE CENTERS ARE REDESIGNED

The Samuel S. Gelber Co., manufacturers of Star Boring Tools, announce the complete redesign of one of their products, the Star Live Center. This tool has the same general dimensions as a standard dead center. The spindle is made of high grade alloy steel, hardened to 64 Rockwell, then precision ground; the tips are ground on their own axes, assuring precise accuracy. Star Live Centers are fitted with ground thrust type ball bearings, and Oillite radial bearings. The shaft revolves in an antiscoring lubricant which is able to withstand pressures of 50,000 lbs. psi. A grease port in the tail allows pressure greasing. Dimensions and quotations on this new development are available from the Samuel S. Gelber Co., 542 W. Washington Blvd., Chicago 6, Ill.

SYNTRON

RELIABLE
DEPENDABLE

ELECTRIC HAMMERS



Save Money and Time

Scaling rust and old paint from metal surfaces . . . removing old mortar from between bricks for water-proofing . . . in addition drilling anchor bolt holes . . . cutting openings for steam pipes and conduit . . . and a host of other time-consuming jobs around the shop.

Write for illustrated folder.

SYNTRON CO.

300 LEXINGTON

HOMER CITY, PA.

ALL-STATE PRODUCES CAST IRON SOLDER ROD

All-State Welding Alloys Co., Inc., 96 West Post Road, White Plains, N. Y., announces a new cast iron solder rod for repairing cracks in cast iron. This rod produces corrosion resistant welds and it repairs cracks in cast iron which must be water-tight and pressure-tight up to 1000 pounds per square inch. It is also used for sealing and filling cracks and blowholes and for building up where strength is not required. It melts at a very low temperature—600 degrees Fahrenheit—and tins easily and exceptionally rapidly.

This rod produces results in many types of automotive repair jobs; it is used for such applications as building up broken corners and low spots in motor blocks and cylinder heads, for soldering cracked heads on car motors, and for tinning the bottom outlet of car radiators in preparation for soft-soldering it to the copper bottom of the radiator. It is also used for replacing eroded areas on salt-water marine engines. This rod, known as All-State No. 7 cast iron rod, is used with All-State No. 7 flux, except for brazing dissimilar metals to aluminum, where All-State No. 53 flux is used.

AMES TRUTEST INDICATOR

Automatic reversible action, that eliminates the tripping of a latch in changing from "over" to "under" work, is a feature of the new universal indicator, the Trutest, manufactured by the B. C. Ames Co., Waltham 54, Mass. Another exclusive feature has the indicator hand always moving in the same (clockwise) direction, whether the top or the bottom of the contact point is in use. The contact finger is easily swiveled to the desired angle, which is maintained without slippage. The contact itself is attached by screw threads; therefore, it cannot drop out. The dial is 1-3/16" diameter for easy, quick reading. The contact points, all staffs and pinions are of hardened steel.

Two contacts are furnished: .100" dia. and .031" dia. Also two support bars: 1/4" wide for tool post work, and 1/8" wide for height gauge work. The Trutest is available in two models, No. 1 reading in .0005", with 0-15-0 dial; and the No. 2 reading in .0001", with 0-4-0 dial.

Rugged construction provides protection to the sensitivity and accuracy of this extremely flexible indicator. Factory tests have shown that appreciable time is saved by the use of a Trutest on varied types of work, such as tool making, inspection work, production and special fixtures.



Do You Know . . .

Janette Builds BOTH Motorized and Motorless Speed Reducers.

32 styles and types of motorized and 20 motorless machines are available with foot or flange bases. ¶ Janette built motors are designed specially for driving Speed Reducers. ¶ Various types of motor enclosures, modifications, voltages, phases and speeds can be furnished. ¶ All Motors and Reducers are Built to ONE Standard of Quality.



NEW PUNCH-LOK CLAMP-MASTER KIT

A new Clamp-Master Kit that provides a simple, easy and inexpensive method of clamping, splicing, tying, mending and banding, has been developed by the Punch-Lok Company.

According to the manufacturer this new Kit offers many possibilities as a maintenance tool for garages, homes and industries. It contains a Clamp-Master Tool for tensioning and locking all clamps, 31 flat strip steel clamps of assorted sizes, and 14 open and clamps for use where the ends of the object to be clamped are obstructed.

The Clamp-Master Kit is ideal for hose clamping high or low pressures, maintenance of a general nature and miscellaneous repairs which can be made in a few minutes on round, square or oblong objects from $\frac{1}{2}$ " to 10" in diameter. The Kit is also useful for splicing cable, tying conduit to pipe lines, maintenance work on tools, machinery, farm implements, electrical equipment, buildings, fences, and many other applications. Altho no special skill is needed to operate the tool, simple instructions are included with each kit.

The Clamp-Master locking tool, Model P-38 weighs less than one pound and can be used in confined spaces. Descrip-

tive literature available upon request to the Punch-Lok Co., 321 No. Justine St., Chicago 7, Ill.

SYNTHETIC CUTTING AND GRINDING OIL

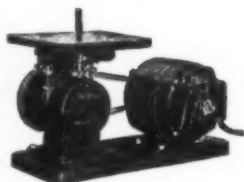
Machinery Lubricants, Inc., producers of Silver-Chip No. 60 Cutting and Grinding Oil, originally a war-time development, are now manufacturing it for national distribution. It is claimed that this product mixes easily with water of any degree of hardness, and offers a true solution instead of an emulsion. Water mixtures of 1 to 25, 1 to 50 and 1 to 100 provide high lubricity as well as actual transparency when compared with water-soluble cutting and grinding oils.

Of particular interest to metal-working concerns is the ability of this product to exceed conventional water coolants in range of utility and to provide a coolant satisfactory for numerous types of tough metal-cutting jobs ordinarily requiring straight-oil type coolants.

The manufacturer offers a free working sample to any metal-working concern of established credit. Further information supplied by Machinery Lubricants, Inc., Dept. BB, 31 St. James St., Boston 16, Mass.

SPEED UP

your tedious hand filing
of dies with this



POSTEL DIE FILING MACHINE

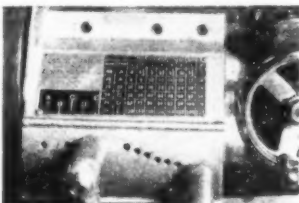
Complete (without motor) **\$45.60**
F.O.B. Minneapolis

POSTEL MANUFACTURING CO.

244 - 17th Ave. No.

Minneapolis 11,

Minnesota



Quick Change

GEAR
BOX

CUTS THREADS

4 TO 224 PER INCH

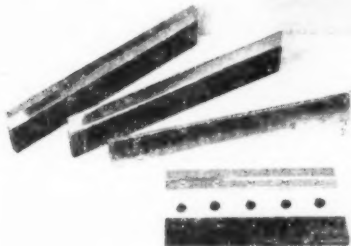
Fits Atlas, Logan, Craftsman and Power-Kraft Lathes. For fine turning . . . bronze bearing thruout . . . aluminum casting . . . steel gears . . . speedy . . . easy to install . . . simple to set. Now reverse furnished for Atlas. Only \$75.00 F.O.B. Chicago, guaranteed.

O'BRIEN MACHINE CO.

Dept. A, 1520 Highland Ave., Chicago

BRONZE CENTERLESS GRINDING BLADES

The Foulk Manufacturing Co. announces a complete line of Ampco Bronze Centerless Grinder Blades. They are recommended for grinding stainless steel, monel, aluminum, or other materials that will "pick up" or score easily. By their



use, greater feed angles and regulating wheel r.p.m. can be attained. Although Ampco Bronze will outwear other blade materials normally used in grinding stainless steel, quick change insert type construction is used, enabling application of

one or two blade bodies with many inserts to maintain high production at minimum blade cost.

Ampco Bronze Centerless Grinder Blades are available from stock to suit most standard Cincinnati Centerless Grinder Work Rests. Special applications will be quoted on request to the Foulk Manufacturing Co., 4208 Airport Road, Cincinnati 26, Ohio.

RAMS-HEAD GRINDING WHEELS

The Rams-Head Co. of Franklin, N. J., manufacturers of all purpose grinding wheels, have developed two products of unusual content and wear characteristics. The Rams-Head Green Wheel is useful for all general grinding requirements, according to its manufacturers. The same wheel may be used for making both a rough and finish grinding; it is rapid cutting, and will produce a fine finished surface. The Rams-Head Co. claims that the Green Wheel stands up under extremely difficult grinding jobs including the new super-hard alloy steels, and removes metal at a rapid rate, due to the special content of the abrasive.

The Blue Wheel has been specially developed for form grinding, it cuts at a slower rate than the general purpose



Why BREAK 'em ?

**HOW MUCH DOES IT COST YOU
TO REPLACE BROKEN DRILLS,
TAPS, REAMERS, ETC.?**

Added to losses due to work spoilage, labor of extracting broken pieces and production line tie-ups, it can be a formidable total.

You can cut these mounting losses easily by the use of BUFFALO TORQUE CONTROL COUPLINGS. Adjusted at a fixed torque to perform a particular operation, these couplings automatically throw out when overloaded, thereby releasing the driving power thru the couplings themselves, but automatically re-engaging and re-assuming the driving power when the over-load has been removed.

Available in production and utility models, in sizes for all operations on drilling machines, lathes, turret lathes, boring mills, etc. Also manufactured as stud drivers, nut setters and transmission types.



Machine Tool Type
Production Model

Descriptive Bulletin No. 1007 sent on request

BUFFALO MACHINERY CO., INC.

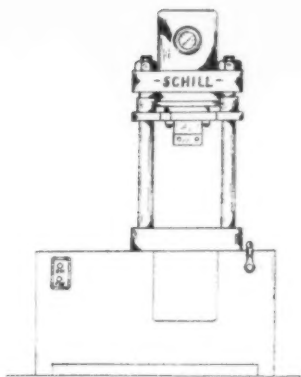
838 Grant Street

Buffalo 13, New York

Green Wheel, but retains its form in grinding corners, radii, or undercuts. These wheels require only infrequent dressing. The Rams-Head Wheels may be used for either dry or wet grinding, and are adjustable to all existing types of grinding machines. Further information regarding this product may be obtained from the Rams-Head Co., Dept. BB, Franklin, N. J.

SCHILL UNIVERSAL HYDRAULIC PRESS

The new 4-column Schill Hydraulic Press, of all-steel construction, is designed for drawing, forming, blanking, coining, embossing, etc. Its standard features are a hydraulic operated 2-way cylinder with fast ram action, selective stroke and pressure control. The ram is equipped with a removable cap slide with positive knockout arrangement for holding punches. The bed is arranged to accommodate pressure attachments and air cushions. The Schill press is self-contained with a complete hydraulic unit, including the motor, enclosed in the base. The presses are manufactured in four standard models, with capacities of 25, 50, 75, and 100 tons. The 25 and 50 ton models are



equipped with 9" ram travel, and the 75 and 100 ton models with 12" ram travel.

The Schill Hydraulic Press is a development of the Edward Franklin Schill Corp., 41 Cortlandt St., New York 7, N. Y., manufacturers of hydraulic presses.

Motorized HOPPER UNITS

*Speedy
Sturdy
Dependable*

Easily adapted to presses, centerless grinders, thread rolling and slotting machines or special machine. Made in four diameters, 10", 12", 16" and 24".

FEEDS PARTS WITH SURPRISING EFFICIENCY

Screws, Screw Blanks, Rivets, Pins, Discs, Nuts, Bearing Rollers, Steel Balls, Washers, and special parts adaptable to hopper.

Made in 4 Diameters, 10", 12", 16", 24"

Send Samples for Details and Prices



DETROIT POWER SCREWDRIVER CO.

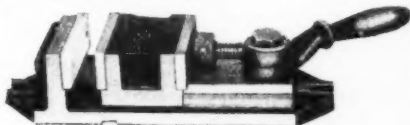
2809 W. Fort Street
Detroit 6, Michigan

"MODERN" VISES

are precision-built with hardened and ground jaws for rapid production work on milling machines, shapers and drill presses.

CAM VISES . . .

Jaw dimensions: width 4" or 5", depth 1½", maximum opening 2" or 3".



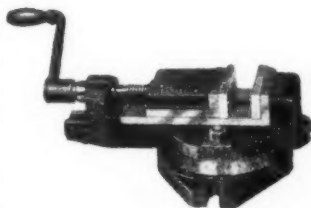
. . . SWIVEL VISES 4", 5", 6".

Write for folders

MODERN TOOLS

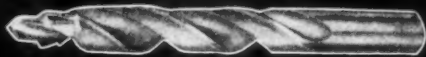
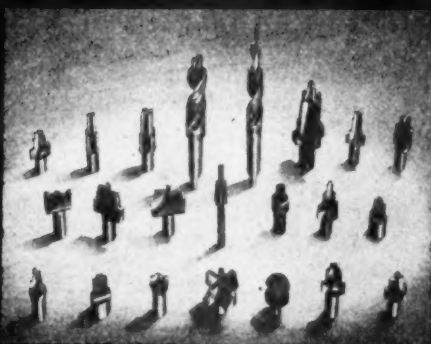
BERLIN, CONN.

Manufacturers of Precision High Speed
Steel and Carbide Cutting Tools.



Spiral PRECISION TOOLS . . .

Make your tooling problem ours. We are equipped to make cutting tools of all kinds to YOUR SPECIFICATIONS, or our engineers will design the proper tools to do your job. YOU CAN BANK ON OUR DELIVERY PROMISE. We make Eccentric Relief Cutting Tools, Carbide-Tipped Cutting Tools, Step Drills, Step Reamers, etc. Tolerances are maintained exactly. Send us your sketch or blue print for quotation. If it is a Cutting Tool We Make It.

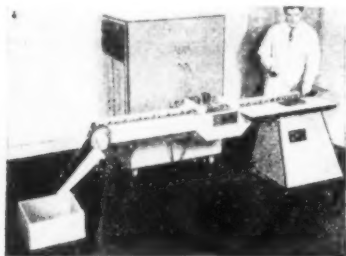


SPIRAL MANUFACTURING CORP.
3612 NO. KILBOURN AVE. CHICAGO 41, ILLINOIS

When Writing Advertisers Please Mention MACHINE and TOOL BLUE BOOK

LEPEL CONVEYOR BELT HANDLES SMALL PARTS EFFICIENTLY

Lepel High Frequency Laboratories, Inc., New York City, has announced its new conveyor belt table, for use in conjunction with any Lepel high frequency unit, or other makes of induction heaters, for the efficient handling of work parts for brazing, soldering, annealing, hardening, etc.



In the illustration, the application is the annealing of the top edge of hardened steel wedges, 4" long x 1/4" thick, for the

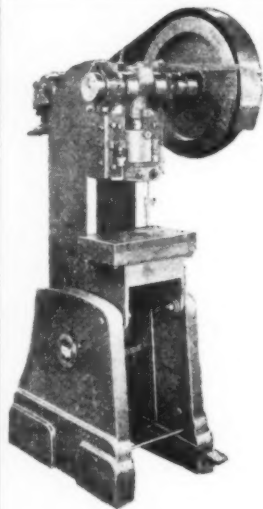
purpose of reworking; 1800 pieces per hour can be annealed with the Lepel No. 15KW unit in the background.

The conveyor belt is powered by a 1/4 hp motor, and the belt speed may be regulated over a wide range to accommodate a variety of applications. The conveyor belt itself permits the fastening of interchangeable supports to hold various shapes of work parts in place. The load coil in the center of the table is movable, and may, for example, be placed at the extreme left of the conveyor belt for hardening applications, at which point the part would drop directly into a quenching tank.

LIGHT WEIGHT ASSEMBLIES HEAT-TREATED BY AUTOMATIC MACHINE

Automatic gas-fired machines are improving heat-treatment of fragile assemblies weighing only a few ounces. Magnetic pull wires, used in business machines, are an example of how closely-controlled heat can produce a superior result at a high production rate.

These pull wire assemblies consist of two eyelets both welded to a connecting high-carbon steel wire. The eyelets must be hardened for greater wear resistance and the weldments annealed to prevent



The U. S. 12-Ton No. 1 PUNCH PRESS

- All Steel Frame
- All Bronze Bearings
- Modern Design
- Heavy Construction
- Precision Built

Standard Specifications

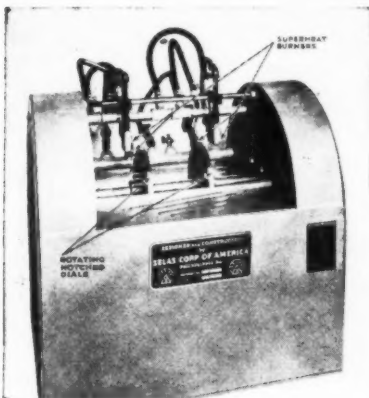
STANDARD STROKE	2"
SHUT HEIGHT	6 1/8"
AREA BOLSTER	8" x 14"
FRAME OPENING	7 3/8"
DIA. OF SHANK	1 1/8"
STROKES PER MINUTE	140-165
MOTOR REQUIRED	3/4-1140
WEIGHT OF PRESS	900 LBS.

Immediate Delivery

FOR FULL INFORMATION AND PRICE LIST
SEE YOUR LOCAL DISTRIBUTOR OR WRITE US

U. S. PRESS and TOOL CORP.
6456 NORTH HAMLIN AVE.
CHICAGO 45, ILLINOIS

breakage. Both objectives are accomplished simultaneously by gas heat in an automatic machine designed and built by



the Selas Corporation of America, Philadelphia 34, Pa.

The assemblies are placed on a rotating drum. The eyelets are heated to harden-

ing temperature by a set of staggered high-heat burners and quenched by a water spray attached to the side of the burner. A second set of burners anneals the weld and applies cooling water to the hardened eyelets so that they will not be annealed. The production rate is about 1200 pieces per hour, manufacturing costs are lowered and metallurgical results are superior to any previously obtained, according to the manufacturers.

HEAVY DUTY MIDGET ARBOR PRESS

The Tunstead Machine and Tool Co. has developed a new midget arbor press of simple but rugged construction. It can be used on various types of assembling operations, and is also applicable to the cutoff of light metals and plastics, as well as being adaptable to special work.

This new midget press has a spindle clearance of 3", and a column clearance of 1 1/8". The stroke length is 1-13/16", and the pad measures 2" x 1 3/4". The accessory may also be furnished with a return spring and adjustable stop screw.

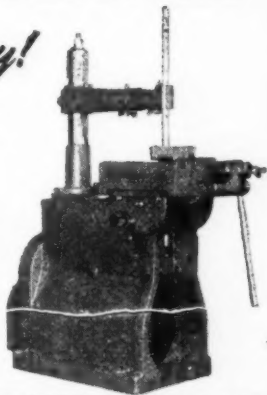
The press is manufactured by the Tunstead Machine and Tool Co., 62 Standish Ave., West Orange, N. J., and is being distributed by H. Wilson Ryno, 1060 Broad St., Dept. BB, Newark, N. J.

BAKER

KEYSEATER

for Speed and Accuracy!

Baker Model O Keyseater meets demands for speed, accuracy and alignment in the finished Keyseat. Soundly designed...sturdily built for trouble-free, long-life performance. Operated on the draw cut principle: equipped with a push-button controlled, non-reversing type, 2 HP, 1200 RPM motor, mounted on a pivoted base; crank action adjustable for setting stroke from 0 to 9". Capacity ample to cut Keyways in mild steel up to 9" long by 1" wide at a feed of .005". Write for bulletin.



BAKER BROTHERS, INC.

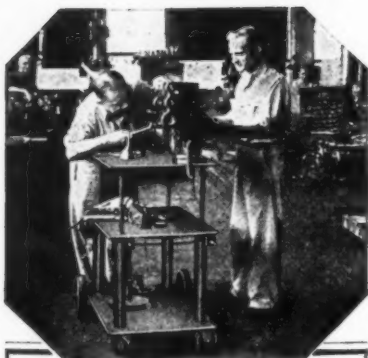
TOLEDO, OHIO

Drilling, Boring and Tapping Machines

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MECHANICAL MUSCLE

Portelvator, the Hamilton Portable Elevating Table, forms a work bench when and where you need it. Saves the use of "extra hands" in moving and lifting heavy loads. Levels and supports overhanging work.

May be worked at from four sides. Three table surfaces. Four point support. Fast lift and slow lift mechanism. Positive floor lock.

Standard model capacities, 1,000 to 5,000 pounds. Special models built on order.

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SUPER SENSITIVE DRILLING AND TAPPING MACHINES • PORTELVATORS



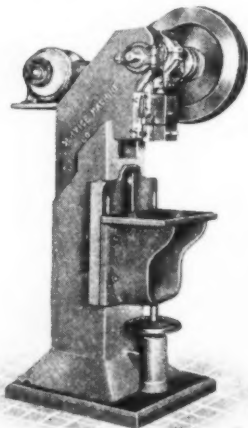
THE
Hamilton

TOOL COMPANY

824 SO. NINTH STREET • HAMILTON • OHIO • U. S. A.

ROUSSELLE 15-TON PRESS HAS DUAL ADAPTABILITY

The new fifteen-ton Rousselle Press, designated as No. 15-H, is extremely flexible in its range of usefulness, and can be adapted to a wide variety of work, according to its manufacturers, the Service Machine Co. It may be used either as a Horn Press or an Adjustable Bed Press. An outstanding feature is the bed table, which is adjustable to whatever die space is required; maximum die space is 13", and the minimum is 5½". The working surface of the bed table is 11" x 15"; it may be bored for blanking jobs without interference with the elevation screw. The press is also provided with a 3" horn hole which can be used for horning dies by removing the bed table.

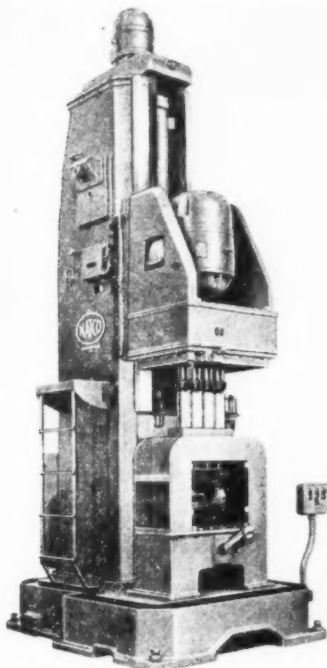


An eccentric crankshaft, with large diameter at the crank pin, reduces the bearing pressure and increases rigidity. The standard stroke is 2", but any stroke can be furnished up to 3". An automatic knockout bar and non-repeating clutch are standard equipment. The frame is a rugged semi-steel casting, proportioned for maximum rigidity, with reinforcements in the bearings and throat. The flywheel is of solid type construction; alloy steel inserts or wheel pins engage the round type clutch pin.

Additional information regarding this equipment will be furnished by writing to the Service Machine Co., 7627 So. Ashland Ave., Dept. BB, Chicago 20, Ill.

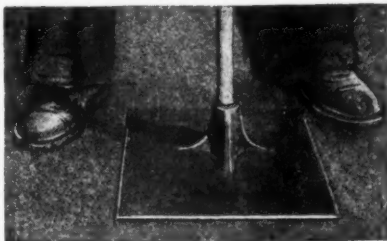
NATCO VERTICAL BORER

The new Natco Holestee vertical machine is designed for cylinder boring of replaceable sleeve liners. This machine is arranged with hydraulic feed and a fixed center gear driven head containing four spindles. The part worked on in this application is a cylinder and crankcase of cast iron, and the production rate is 28



parts per hour. The boring machine is set up to rough and finish bore four cylinder bores to 3.781" diameter and counterbore to 4.001" diameter. The machine utilizes a jump feed to combination rough and finish bore lower holes to 3.719" diameter and chamfer 15° x 1/4" deep. Further details on Natco machine application may be obtained by writing Dept. 24, National Automatic Tool Co. Inc., Richmond, Indiana.

TRY IT!



NEW PLASTIC FLOOR PATCH SETS INSTANTLY

No more plant tie-ups, no traffic delays. Now you can patch dangerous, broken floors without the annoyance of having to close off an area of concrete floor while waiting for newly installed patches to set. Flexrock gives you a new plastic repair material which will take traffic almost the moment it's put down!

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Please send me complete INSTANT-USE information . . . details of TRIAL ORDER PLAN—no obligation.

Name

Company

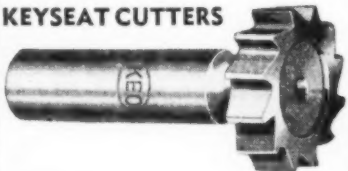
Address

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KEO**CENTER DRILLS**

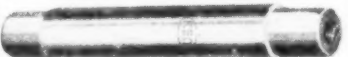
Made of finest high speed steel. Available in all standard sizes. Always in stock for immediate delivery. Specials made to your specifications.

KEYSEAT CUTTERS

High speed. Right hand. $\frac{1}{2}$ " shank. Diameters from $\frac{1}{4}$ " to $1\frac{1}{2}$ ". Standard sizes in stock for immediate delivery. Complete set—41 sizes—available in sturdy, hardwood box. Saves time and money, because you always have the size you need.

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High speed steel. Reamers from $\frac{1}{4}$ " to $1\frac{1}{2}$ " regularly furnished with 60°, 82° or 90° included angle. Specials made to your specifications.

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Precision made of tool steel, hardened and accurately ground. Tapered .0005" to the inch. Mandrels from $\frac{1}{8}$ " to $1\frac{1}{2}$ " are .0005" undersize at small end, from $\frac{1}{8}$ " to $3\frac{1}{2}$ " .001" undersize. Immediate delivery.

Write for Literature

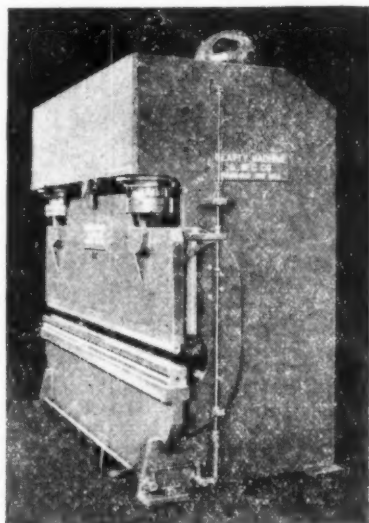
Illustrated literature and prices on all KEO Products mailed on request.

KEO CUTTERS

19326 Woodward - Detroit 3 Mich.

BEATTY HYDRAULIC PRESS BRAKE HAS WIDE ADAPTABILITY

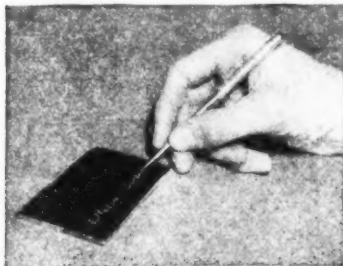
A hydraulic press brake of new design, providing a maximum amount of flexibility, has been introduced by the Beatty Machine and Manufacturing Co. of Hammond, Ind. It is adaptable to a wide variety of V-bending, flanging, pressing and straightening, and handles a diversity of plate thicknesses without the need for minute ram adjustment. Factors have been incorporated to increase productive speed; the ram advances at a maximum of 310" per minute, with a return speed of 285" per minute. Pressing under full load capacity takes place at 14" per minute. These speeds are variable between 0 and maximum.



Balanced control of the ram is achieved in the design of this machine through an equalizer which brings down the ram parallel with the bed. The machine is of the open throat, closed housing type, and is built in capacities from 200 to 600 tons, and in sizes from 8'6" to 12'6" between housings. Stroke control features are incorporated to allow for operating in any portion of the stroke between the top and bottom limits.

LIFELONG SCRIBER RETAINS EDGE ON STEEL

The Electro-Mag Manufacturing Co. has developed a new item, designated as the "Lifelong" Tungsten Carbide Scriber. This accessory, the overall length of which is 4-11/16", with a diameter of .260", is supplied with a medium diamond knurl. According to its manufacturers, this scriber will retain its cutting edge even

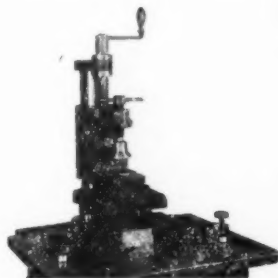


when used on hardened steel or glass. Further description and quotations on

this product may be obtained from the Electro-Mag Manufacturing Co., 315 So. Madison St., Rockford, Ill.

PRODUCTO PUNCH HOLDER REMOVER

The Producto Machine Co. has developed a new Punch Holder Remover. The purpose of this development is to remove punch holders from die beds, and to



separate dies which have been assembled indefinitely, and have a tendency to stick



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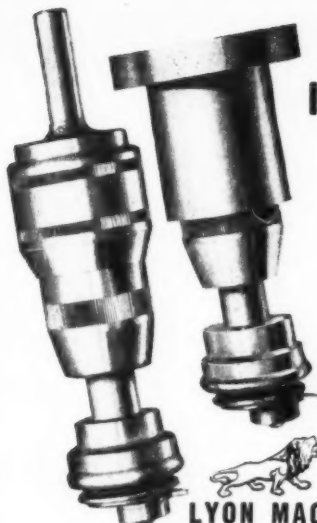
WHEN AND WHERE NEEDED . . .

Design Service Co. offers to manufacturers the facilities of its organization including 450 engineers, architects, designers and draftsmen.

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Tool manufacturers are reducing their engineering costs by using Design Service for complete tool design, patent preparation, or even the production of elementary tracings. Tool users everywhere profit by using this talent in the layout of plant extensions, including tooling-up procedure, structural steel and production methods. Years of experience are available in every phase of the machine tool field.

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The Lyon INTERNAL GROOVING TOOL

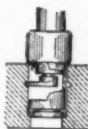
Its versatility saves costly preparation time — provides precision grooving of single or multiple grooves at a production rate — plus economy of set-up time — and low initial cost. The LYON has been designed for making internal grooves to tolerances of .001" using any drill press, turret lathe, radial drill or automatic equipment.

By changing only bushings and cutters within the tool model range, you have at your command a wide variety of bore sizes and shapes. A simple adjustment regulates location and depth of groove. Work cannot be scratched or marred because the head of the tool does not turn when the cutter operates.

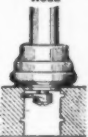
Our Engineering Department will welcome the opportunity of discussing any grooving problem without obligation.



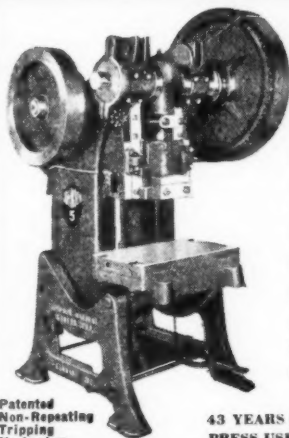
LYON MACHINE CO., WORCESTER 3, MASS.



GROOVE
LOCATED FROM
BOTTOM OF
HOLE



SINGLE GROOVE
LOCATED FROM
TOP OF HOLE



Patented
Non-Repeating
Tripping
Mechanism

UNLIMITED PEAK PRODUCTION

Much larger die space than average presses. Engineered and designed for unlimited peak production.

Reinforced construction at points of greatest wear.

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JOHNSON MACHINE AND PRESS CORP., ELKHART, INDIANA

GIDDINGS-LEWIS PLASTICS INJECTION PRESS

Vertical construction incorporating the use of a single hydraulic cylinder characterizes the new Giddings & Lewis Vertical Plastics Injection Press. This departure in plastics press design means the addition of features which solve or simplify difficult molding problems.



The vertical injection press with only one hydraulic cylinder has a structural advantage. This arrangement provides for clamping the mold halves together and in-

jecting the plastic material into the mold cavity in the same stroke of the piston rod. The piston is powered by a self-contained hydraulic unit, an integral part of the machine. When the cylinder is activated, the piston rod movement operates a toggle mechanism. This initial downward movement of the piston rod locks the die plates together. As the piston rod continues its downward movement, it also serves as a plunger to inject thermoplastic material into the mold. The single cylinder performs a dual function and eliminates the necessity of elaborate mechanisms, achieving a considerably briefer over-all cycle.

Further information will be supplied by the Giddings & Lewis Machine Tool Co., Dept. BB, Fond du Lac, Wis.

LEMPCO ACCESSORY ELIMINATES MISALIGNMENT

Misalignment of punch press equipment no longer need be a headache for plant superintendents and punch press operators. According to Lempeco Products, this problem has now met its equal in the form of "Di-Ali-Ners", manufactured by this concern.

These accessories consist of a pair of semi-elliptical plates, one concave and the other convex, both with flat exterior surfaces. Each plate contains a hole large enough to clear any die set shank. Installed with their curved surfaces facing each other, "Di-Ali-Ners" will correct bad errors of alignment, whether the fault lies between press bolster and dieholder or between the press ram and punchholder—either right to left or front to back. They may be installed with a minimum of set-up time. "Di-Ali-Ners" are made of a special malleable iron analysis, machined and cadmium plated to assure a long service life.

Additional information and explanatory folder will be supplied by Lempeco Products, Inc. Dept. BB, Bedford, Ohio.

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HARDWARE DIVISION

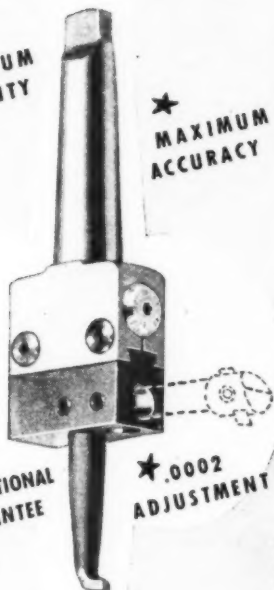
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CHICAGO 24, ILLINOIS

The
MAXWELL
Precision Boring Head

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MAXIMUM
CAPACITY

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MAXIMUM
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• 3 sizes from \$44.00 to \$105.00.
Boring capacity $\frac{3}{8}$ " to 15". Avail-
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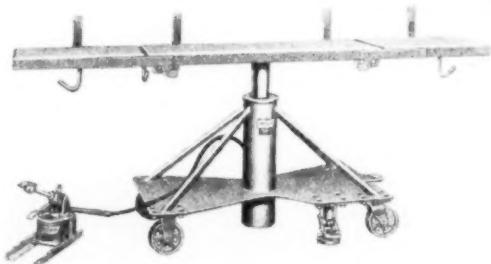
JOHNSON GAS APPLIANCE CO.

570 E Ave. N. W., Cedar Rapids, Iowa

HYDRAULICALLY OPERATED STRIP FEEDING TABLE

For feeding strip or sheet metal to shears, rolling mills, punch presses, and similar applications, Lyon - Raymond Corporation offers a specially adapted hydraulic elevating table. It is designed to accommodate bundles of stock, loaded by overhead hoists or fork trucks. Its elevating feature enables an operator to maintain stock at the desired height for feeding into dies or shears, and eliminates manual handling which could result in bending or damaging of stock. Since the feeding table is portable, it can be moved with stock to another press in case of die breakdown.

The pump is joined to the central cylinder by a flexible hose which permits locating of the pump where it is most convenient to the machine operator, and it may be suspended from the table top



when it is necessary to move the entire unit. The table top consists of one rigid section, the same length as the base, plus two removable extensions designed to support longer loads. For additional information on this product, address Lyon-Raymond Corporation, 3404 Madison St., Greene, N. Y.



DOWEL PINS



Immediate Delivery!

Standard Size Dowel Pins from $\frac{1}{8}$ " to 1" diameter and from $\frac{3}{8}$ " to 6" length supplied in .0002 and .001 over basic sizes. Unless otherwise specified, .0002 oversize will be furnished.

SCHULTZ & ANDERSON CO.

109 Edison Place, Newark 5, N. J.

GRANT RIVETERS

have
SPEED
and

STAMINA

These GRANT Riveters are available in Noiseless Spinning and Vibrating Hammer types. Also Vertical and Horizontal Multiple Spindle Spinning Machines.

Information? Write!

THE GRANT MFG. & MACHINE CO.
C E Station, Bridgeport 5, Conn.



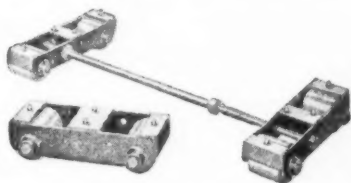
TECHTMANN DOLLIES EQUIPPED WITH ADJUSTABLE EXTENSION BAR

Techtmann Industries, manufacturers of Skid-Rol Dollies, announce a new development with their "5-Tonner" Model, with an adjustable connecting bar, for lighter loads than carried on their standard 10 to 12-ton models. These accessories carry heavy freight, machinery, or dies, a few inches from the floor, minimizing the possibility of accidents. The extension bar, obtainable as auxiliary equipment, is of special value to plants using standard boxes or skids.

Each "5-Tonner" Dolly is $15\frac{1}{4}$ " x $6\frac{1}{2}$ " x 4" high, with two $3\frac{5}{8}$ " diameter solid steel rollers, equipped with roller bearings lubricated with Zerk fittings. The frames are of arc-welded structural steel. The extension bar is of $\frac{5}{8}$ " cold-rolled steel telescopes inside iron pipe. The minimum span of a pair of dollies equipped with extension bar is 36" over-

all; the maximum is 56". The adjustment is locked by a nut running on taper thread.

Welded steel cleats bite into wood skids, preventing slipping or shifting of loads. When inverted, the Skid-Rols may be used as stationary dollies, for rolling



girders, etc. Further information regarding this new product may be obtained from Techtman Industries, 714 W. Wisconsin Ave., Milwaukee 1, Wis.

Severance

TUBING CUTTER GROUP - FOR FAST DEBURRING OF EVERY MACHINEABLE TYPE TUBE ...

TUBE DEBURRING CUTTERS (Standard)



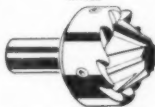
18 Standards in H.S.S. and
Cemented Carbide

ADJUSTABLE TYPE



Adjustable from $1/2$ " -
 $2-1/2$ " O.D.—for short runs

TUBE CHAMFERING MILLS



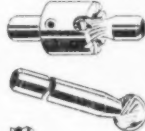
23 sizes from $3/16$ " - $2-1/2$ "
O.D. — Chatterless

SOLID TUBE DEBURRING CUTTERS



16 sizes from $1/4$ " - $1-5/8$ "
O.D. — H.S.S. and Carbide

SPECIAL TUBING CUTTERS



From light hand-deburring up to close tolerance deburring, chamfering, flaring ... For working non-ferrous metal, steel (including stainless) and plastic tubing ... For combining reaming, sizing or flaring with end facing and deburring ... Whatever the operation or material, Severance HSS and Cemented Carbide Tube Deburring Cutters are TOPS in performance—long life—economy.

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INTERNAL RADIUS BORING TOOL

This tool has been designed, and patent applied for, by McKenzie Engineering Co., Newton, Conn. It can be made up to fit the taper of a lathe tail stock, or to be held between the centers, or to fit in the tool post of a turret lathe. According to the designer, it has an easy feed that insures a smooth radius; it may be set for any radius within its limits.



The cut shows two internal radius boring tools of different diameters, and some samples of parts machined by them: two pillow blocks of different sizes; a self-aligning connecting rod, which if cut in half would be two rod ends; the self-aligning pipe union would save many of

them from having their threads crossed while fitting if not properly lined up. Other parts may be designed for self-aligning with these internal radius tools.

IMPROVEMENTS IN VEMCO DRAFTING MACHINES

Featuring important improvements in design and construction, a new model of Vemco Drafting Machine has been announced by the V. & E. Manufacturing Co. Band covers which protect the bands from dust and dirt are now supplied as standard equipment on the new models. They are formed of steel, and are designed not to interfere with the flexibility of the drafting head of the machine. The plastic brake plates have been replaced with metal plates, and the brake action has been improved.

The new Vemco machines are supplied with a metallic blue-green finish on the brackets, support, band covers and clamp. This color was selected because of its freedom from eye strain, as well as its harmony with other colors. Other metal parts of the machine are satin finished and tarnish proof. A catalog of Vemco Drafting Machines and other drafting equipment will be sent free on request to the V. & E. Manufacturing Co., 758 Fair Oaks Ave., Dept. BB, Pasadena, Calif.



Spiral Flute COUNTERSINKS

Aero Spiral flute Co-sinks end chatter, cut clean and accurately. Stocked in 60, 72, 82, 90, 100, 120 degree included angle, $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " diameter, with $\frac{1}{4}$ " shank and $\frac{3}{8}$ ", and 1" dia. with $\frac{1}{2}$ " shank. Available from your Mill Supply dealer or direct.

AERO TOOL COMPANY
229 WEST OLIVE • BURBANK, CALIF.



MICROMETER STOP COUNTERSINK

Instant .001" adjustment ± 1900 Micrometer Stop limits depth of Co-sinks and Co-bores. Assures flushness. $\frac{1}{4}$ " Shank for drill press or hand drill. Cuts metals or plastics. Micrometer Stop \$7.25; HSS Cutters— $\frac{7}{16}$ " dia. \$1.75, $\frac{1}{2}$ " dia. \$2.35. Specify incl. angle and pilot. Folder free.

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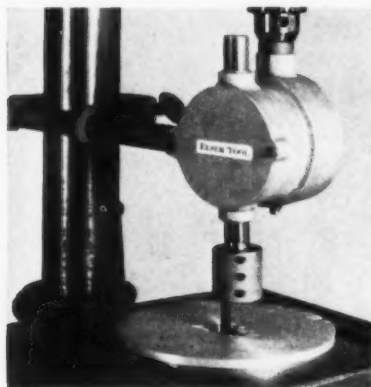
40-30 23rd STREET
LONG ISLAND CITY 1, NEW YORK





ELSER RECIPROCATING ATTACHMENT HAS WIDE APPLICATION

The Elser Tool Co. has developed a new Reciprocating Tool Attachment for use



with drill presses and similar shop equipment. This useful accessory will file, saw,

lap, hone, slot, punch, stamp, rivet, and mark, by attachment to a drill press, according to its manufacturer. In a vertical mill, it will precision shape or slot dies, plates, gears, and like parts.

The Reciprocating Tool Attachment is adjustable to as much as 30° either side of center. Its speed range and throat depth are determined by the capacity of the machine to which it is attached. The accessory is attached to any round column drill press up to 3 3/4" in diameter, by means of a clamp. The spindle fits any 1/2" drill chuck. Any standard hack saw blade may be used, and the 3/8" hole through the tool holder permits full length of all files. The stroke length of the Attachment is fixed at 1 1/4". All component parts are enclosed in a drum-type housing.

Additional information regarding the Reciprocating Tool Attachment will be furnished by the manufacturer, the Elser Tool Co., 23902 Van Born Road, Dearborn, Mich.

The following tools rank the same in order of room temperature hardness and "red" hardness (hardness at high temperature): diamond, carbide, cast alloy, cobalt H.S.S., Plain H.S.S. tools.



LINLEY

FOR NOISELESS, HIGH SPEED RIVETING

Rotary spinning principle shapes uniform heads, silently... capacities up to 3/8 inches diameters. Adjustable spindle stroke, controlled pressure... double row radial thrust bearing supports spindle, assures long life. Table elevating screw prevents slipping. Six floor or space-saving bench models...sturdily built for trouble-free operation under severe production schedules.

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WRITE FOR BULLETIN.**

**LINLEY BROTHERS CO., 663 STATE ST. EXTENSION
BRIDGEPORT 1, CONNECTICUT**

There's an Easier Way!



to Solve **LEAD HAMMER BOTTLENECKS!**



**DO IT WITH THE NEW COOK
3 IN 1 LEAD HAMMER MOLD!**

It's a production hammer mold . . . makes three lead hammers as fast as ordinary molds make one!

It's expressly designed to mold hammer heads in 3, 4, 5 or 6 lb. sizes around COOK SHUR-GRIP HAMMER HANDLES . . . the drop forged handles that mean certain safety!

It's easy to use! Close lid . . . pour lead directly from lead pot or ladle and **THREE** hammers are molded!

Try it . . . The COOK 3-in-1. Production Lead Hammer Mold!

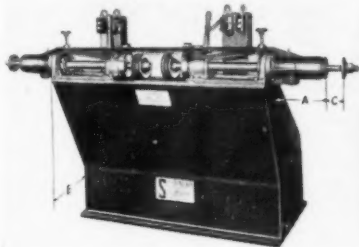
Address Dept. "7" for complete lead hammer service literature and price list!

LAWRENCE H. COOK, INC.

Distributors To The Johnson Tool Co.
65 MASSAHOI AVE., EAST PROVIDENCE 14, R. I.
PLASTIC MOLDS AND TOOLS

NEW BUFFER AND POLISHER HAS OVERHANG BASE

A two-motor Proper Speed Buffering and Polishing machine with overhang base construction has been designed by the Standard Electrical Tool Co. Each side of the machine is independent of the other, having its own motor, starting equipment, multiple V-belt drive and shaft lock. This arrangement permits two operators to work independently of each other on opposite sides of the machine.



In the illustration, the "E" dimension is 13", and reflects a convenience in handling large or bulky work. The "A" dimension is standard at 7", but can be supplied in 11", 17", 20" or to order. The Standard Buffer and Polisher is available in sizes to accommodate 2, 3, 5, 7½, 10, 15, and 20 hp motors. The spindle speed is of the user's selection. An optional accessory is "Speedial" control on each spindle to provide speed range of between 1500 and 3000 rpm.

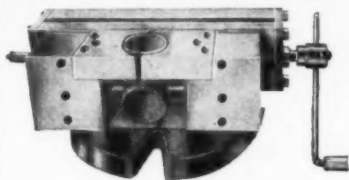
Further information and quotations on this new equipment will be supplied by the Standard Electrical Tool Co., 2486 River Road, Cincinnati, Ohio.

PRATT & WHITNEY ELECTRO- MECHANICAL LEAD TESTER

The Model C Electro-Mechanical Lead Tester has been developed by Pratt & Whitney, Division Niles-Bement-Pond Company in West Hartford, Conn., to check lead errors of commercial threads on a large variety of sizes.

Workpieces up to 10" in diameter and 30" long can be held between the tail-stock centers. Work longer than 30", ranging from ¼" to 3" in diameter, can be checked using V-block work supports. Twenty-six inches of threads can be checked in one setup. Taper threads are checked in the same manner as

CUT TOOLING AND HANDLING COSTS —



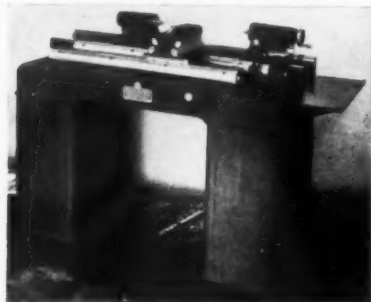
John's Jigs and Fixtures can be adapted for a wide range of jobs, saving you money in first cost, and in handling the work, into and out of the machines. These sturdy, dependable fixtures will help you reduce production costs.

Let us send details.

HEUSER MFG. CO.
1638 N. Paulina St., Chicago, Ill.

straight threads with no special setup required.

The measuring head is a standard P & W Supermicrometer Headstock with a 1" spindle travel mounted on a special base.



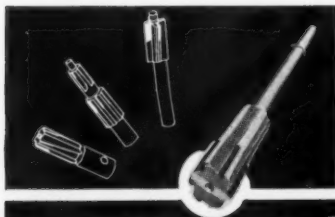
The spindle is graduated by .05". The dial has 50 graduations of .001" each, with a vernier which reads directly to .0001". This spindle subdivides any given inch along the work, while even inch increments are obtained by using precision end measures. Thru the use of this headstock,

lead readings can be taken between each individual thread quickly and accurately.

The thread locating head is a standard Electrolimit universal circuit head with ball point holder and ball point. This head operates the meter which is conveniently located on the measuring head. By turning the dividing screw on the measuring head the ball point is centered in the vee of the thread. The desired measuring point is reached when the meter indicates zero. The lead is then read directly on the measuring head.

The carriage travels on a ball slide parallel with the work centers, and the cross slide travels at right angles. This component which also carries the thread locating head, is a spring loaded device which gives the correct gaging pressure on the ball point when centered in the thread, regardless of the work diameter and pitch. The cross slide can be locked out of position when not taking actual measurements.

The carriage counterweighted which keeps the pressure against the end measures and measuring head constant at all times. An automatic safety stop is provided to eliminate the danger of the carriage striking the measuring head spindle anvil and thus damaging the precision measuring screw.



We are now ready to add more distributors to handle Schmarje Carbide-Tipped High Production Tools. If this interests you — write

SCHMARJE TOOL AND ENGINEERING CO.
MUSCATINE, IOWA



The Standard of QUALITY

All standard sizes carried in stock for immediate delivery. Special cutters made to Blue Print.

As Cutter Specialists since 1919 we are able to offer the highest quality and service at attractive prices.

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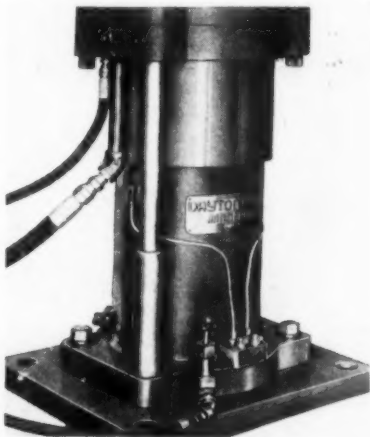
DIAMONDS
FOR THREAD GRINDING TOOLS

DIAMONDS
FOR ALL INDUSTRIAL PURPOSES

KOEBEL
KOEBEL DIAMOND TOOL CO.
2459 Grinnell Avenue, Detroit 13

DAYTON ROGERS HYDROPNEUMATIC DIE CUSHION

The Dayton Rogers Manufacturing Co. announces a hydromatic die cushion, built in three sizes, having ring holding pressure from 2½ to 55 tons, which may be developed from a 75-pound shop airline. These cushions may be used on inclinable or straight side presses, and have deep drawing capacities from 1" to 10". They are designed in such a manner that no punch press pit is required. These Die Cushions, designated as Model K, may



be used in multiples of two, three, or four, on all double crank presses. Each installation is provided with the necessary control valve mechanism, ready to install.

Pertinent information is available by writing to the Dayton Rogers Mfg. Co., 2835 12th Ave., South, Minneapolis 7, Minn.

SUPER TOOL CO. STANDARDIZES LONG FLUTE CARBIDE REAMERS

Carbide Tipped reamers with the tips running the entire length of the flutes have been standardized, and are now stocked in 32 sizes ranging from ¼" to 1½", by the Super Tool Company. This tool has proven so superior on operations where close tolerance and high finish are required that users have specified it even at special price and delivery.

The long tips serve as wearing guides when operated thru brushings and prevent the reamer from freezing up in

bushings due to galling. The tool also maintains its size longer, thus close tolerances can also be maintained longer. Improvement in finished machining processes is accomplished because chips are cleared, preventing loading in the flute,



and scoring the finish. The usable life of the flute-long carbide tipped reamer greatly offsets the increased cost due to the additional length of the carbide tips used, according to the manufacturer, Super Tool Co., 21,650 Hoover Road, Detroit 13, Mich.

OIL PRESSURE SAFETY DEVICE

Machine and engine breakdowns and costly repairs due to pressure lubrication failures can be largely eliminated by a new oil pressure activated safety device

called Oiltrol. Installed in the lubrication system, any drop in oil pressure below predetermined safe operating levels will activate the Oiltrol unit and energize danger signals or emergency controls. With Oiltrol, lubrication pressure failures are detected before bearings freeze and extensive damage has occurred.

Wherever gasoline engine powered installations are involved, Oiltrol protection is particularly effective. An oil pressure drop will cause the Oiltrol to break the ignition circuit and the gasoline engine will stop immediately.

Sturdily constructed of aluminum, Oiltrol is simply and compactly designed for easy installation and universal adaptability. No alteration in any existing lubrication system beyond the addition of a spur oil line to carry oil pressure to the Oiltrol switch is necessary to install this new "bearing insurance." Savings resulting from avoiding even one serious breakdown due to oil pressure failure will more than amortize the original costs of plant-wide Oiltrol installation. For complete information concerning Oiltrol specifications and installation, address inquiries to Oiltrol Company, 2550 15th St., Dept. BB, Denver 11, Colorado.

WHITNEY-JENSEN PRODUCTS 30 YEARS EXPERIENCE



No. 38

THROATLESS BENCH SHEAR CAPACITY — 3/16" BLADE LENGTH — 5"

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WHITNEY METAL TOOL COMPANY
115 FORBES ST. • ROCKFORD, ILL.

NIELSEN Heavy Duty *Live Centers*

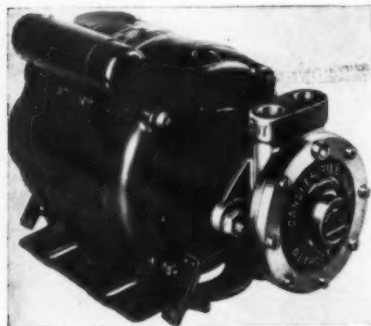
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Adapted
for heavy
duty work.
Precision type
ball and roller
bearings assure
maximum capac-
ity for high speed
production and long
service.

NIELSEN, INC. LAWTON, MICH.

TITAN PUMP ANNOUNCES SERVICE-FREE INNOVATION

Candler-Hill Corporation, Division of Titan Pump and Engineering Corporation, Detroit, Mich., announces the addition of another Titan pump to its line of fuel, lubricating, and water pumps. The new



model, No. 4702, has been developed to comply with the demand for a pump to handle liquids in the medium flow and pressure field where service-free life is

a requisite. The pumping mechanism components are made from corrosion-resisting materials to suit the type of liquid pumped.

The rotating impeller is designed to "float hydraulically" in the housing. Long life operation with negligible loss of either flow or discharge pressure is assured, since there is no metal-to-metal contact between the rotating and stationary parts. Another feature is the ability to flow liquid directly thru the pump when it is not operating, eliminating the necessity for a relief valve. A mechanical face type shaft separates the pumping chamber from a "lubricated for life" ball bearing, thus no further lubrication is required.

The illustration shows the Titan pump direct mounted to the end bell of an electric motor.

GREER AIR GAUGE AND HOSE ASSEMBLY

Greer Hydraulics, Inc. has designed an Air Gauge and Hose Assembly to facilitate the charging of shock struts, emergency air pressure bottles, hydro-pneumatic accumulators, and other similar air pressure vessels with air under pressure from the regular shop air pressure hose. The complete assembly is comprised of a length of high pressure hose line, one end of

Drilling - Boring - Reaming CUT LOADING TIME with ESCO Drill Jigs

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50 sizes always in stock

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100 NEW CHALLENGE SEMI-STEEL SURFACE PLATES HAND SCRAPED SIZE 12" x 18"

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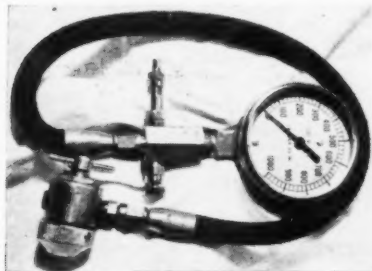
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SHIPPING WEIGHT 80 LBS.

PASSMAN BROS., INC.
1101 W. LAKE ST.
CHICAGO 7, ILL.

which is attached to a special fitting having four ports as follows: One port is connected to the hose line; one port is equipped with a high pressure Schrader air valve for connection to the shop air hose; one port is furnished with an air gauge to indicate the pressure of air in



the vessel being charged. The fourth port is equipped with an air bleed valve to permit relieving some of the air in the charged vessel if too much pressure is registered on the gauge. This provides for extremely accurate pressure charging. The opposite end of the hose line is con-

nected to a special chuck assembly consisting of a swivel chuck which is connected to the air valve of the vessel being charged. A thumb screw is provided for depressing the air valve core during charging operations. For further details, write to: Greer Hydraulics, Inc., Dept. BB, 454 Eighteenth St., Brooklyn 15, N. Y.

FREE SAMPLE LAYOUT FLUID

The Dayton Rogers Manufacturing Co. of Minneapolis, Minn., announces a new 1½ ounce Layout Fluid free sample put up in a combination brush-in-container, very adaptable for shop use.

The Layout Fluid can be used for all-around layout work on all tools, dies, jigs and fixtures and machine castings. Simply wipe the surface very clean and brush on. It dries instantly, and the scribed lines have a pronounced contrast against the dark background, relieving eyestrain and allowing the workman to work accurately to the desired layout. This Layout Fluid may be used to an advantage on all such material as brass, aluminum, stainless steel, copper, etc. No polished surface is necessary for the use of same.

Free 1½-ounce combination brush and container may be had upon receipt of firm's letterhead.

Level in a Jiffy!

4 sizes: 2¾", 3¾", 5¼" and 7½" closed heights. Self-leveling ball and socket cap.



Simplex Mechanist's Jacks cut costs by speeding leveling of work on planers, milling machines, etc. Side lock holds screw at desired height. No. 3A Spreader Jack is invaluable for work in close quarters. Ask your dealer.

Templeton, Kenly & Co.
Chicago 44, Ill.
Better, Safer Jacks Since 1899

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Jacks



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BREAK OFF — and then
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WALTON Tap Extractors

Remove
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Quickly and
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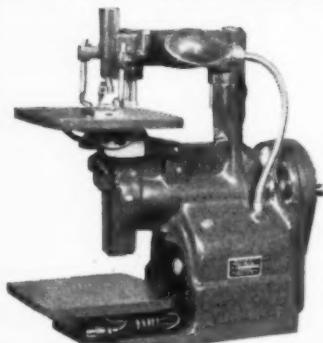
THE WALTON COMPANY
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Attention: Jewelry & Instrument Makers!

NEEDLE FILES AND SAWS

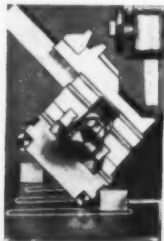
under tension without use of moving rams and arms dangerous to operator's face — **NEWEST ADVANTAGE** with

SYNCHRONIZED DUPLEX DIE & PUNCH MAKING MACHINES



- ▶ **NO CORNER TOO SHARP —**
- ▶ **NO SLOT TOO SMALL !!**

Upper tensioning file and saw holder operates inside a stationary overarm. It is synchronized to stroke with the lower file holder thru an enclosed lever mechanism.



ANGLE MASTER SINE VISES

Fast, accurate angular set-ups; squaring & paralleling.

No. 3 shown side tilted.

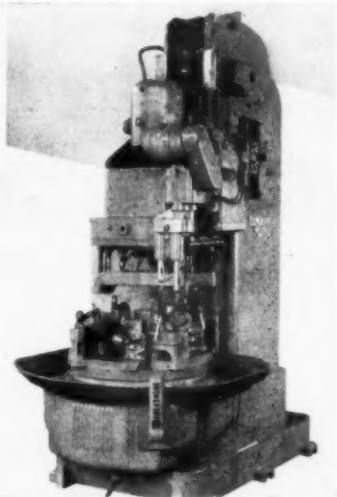
Other models from \$25.00 & up.

IDEAL TOOL AND DIE CO.
733-735 CONGRESS ST.
SCHENECTADY 3, NEW YORK

LEMAIRE NO. 20 COMBINES DRILLING AND TAPPING ON SAME UNIT

The Lemaire Tool and Manufacturing Co., engineers and builders of special machine tools, have recently developed a Vertical Drilling and Boring Machine provided with an offset tapping head as standard equipment. The unit consists of a standard No. 20 Lemaire Drilling Machine and a 30" manual index table; the coolant is included in the base.

The tapping operation is accomplished by a special unit attached to the drill head, but driven by a special motor. The work parts are retained in the holding fixture by a single clamp. Pilot pins on each fixture are nested in the drill head for positive alignment. The fixture is adjustable to four stations, and is designed to hold two parts simultaneously. When the work piece is adjusted to the fixture, the unit loads, drills, spotfaces and taps.



Special features of the Lemaire No. 20 include a conveniently located cycle operating control box, helical gears in all drill and tap heads and the hydraulic drill units, and extra deep chip troughs in the base.

Additional information will be supplied by the Lemaire Tool and Manufacturing Co., 2657 So. Telegraph Road, Dept. BB, Dearborn, Mich.

4-PORT HYDRAULIC VALVE REVERSES CYLINDER WITHOUT PILOT

The conventional 4-port 2-way valve and remote pilot valve combination can be replaced with the new "Rite" 4-port hydraulic cylinder valve developed by



R. I. Task Enterprises, Inc., 250 Auburn St., Cranston 10, R. I., and offered by Morse Boulger Destructor Co., 205 E. 42nd St., New York 17, N. Y. This accessory,

suitable for controlling all types of reciprocating hydraulic cylinders, obtains full reversal actuation from the cylinder itself.

The cylinder reversal can be accomplished with only $\frac{1}{2}$ " travel. The reverse lever swings thru a 45° arc; a positive dog or lever actuation of the reverse lever can be used, as cylinder overtravel is impossible. Features include a positive mechanical shut-off knob which springs into "stop" position, reverse lever which can be moved to any position without causing cylinder movement or creep. Motion can be resumed by pulling out the stop knob and turning 90° to detent position. Internal mechanism operates under pressure balances; no springs are used.

The operating pressure of the valve is from 50 to 300 lbs. psi. It has just four pipe connections—pressure input, line return, cylinder forward and reverse. It has a speed up to 500 cycles per minute. The mounting is supplied in flange, bracket, or face types.

Special models of the "Rite" 4-port valve can be supplied to operate on pressures under 50 or over 300 lbs. psi. Cycling can be provided in automatic, semi-automatic, or manual operation. Water-operated units of corrosion-resisting materials are also available.

PRODUCTION STANDS OUT WHEN PROTECTION IS BUILT IN!

With Junkin Safety Guards on the job, EVERY MINUTE is devoted to production—because costly, time-consuming accidents are eliminated.

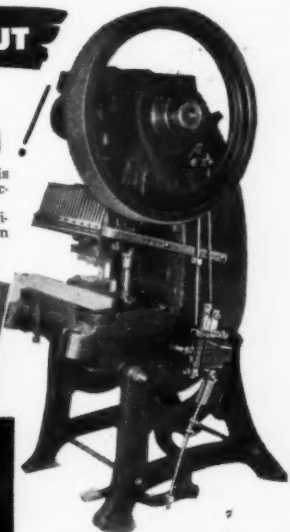
You reap the important benefit of improved worker efficiency too, for with this ever present evidence of protection press operators are able to hit new peaks of efficiency.

Send for bulletins describing the Junkin Safety Guard and Swinging Die Closure. Address:

JUNKIN SAFETY
APPLIANCE CO., INC.
936 W. Hill Street,
Louisville, Ky.



JUNKIN SAFETY GUARD

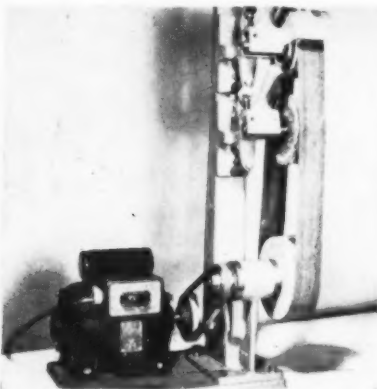


PORTER-CABLE ANNOUNCES NEW UTILITY GRINDER

The abrasive belt has now been applied to the utility grinder, according to a report by Porter-Cable Machine Co. of Syracuse, N. Y. This new development provides the advantages of grinding on an abrasive belt operating over a resilient



contact roll or wheel. Since the wear is on the abrasive belt and not on the supporting contact wheel, the wheel or roll remains flat, square at the corner or side, and maintains its diameter and balance.



The resiliency of the roll eliminates vibration. Inexperienced operators can grind successfully on this balanced roll.

Grinding on the roll quickly reduces the size of stock being ground; this can be squared up on the platen immediately above the roll. Grinding inside of a job is accomplished and held flat by working over the edge of the platen. For grinding and polishing of rounded or oval parts, an additional formed resilient contact roll can be attached to the grinder in place of the platen.

Work is also done on the unsupported abrasive belt, such as in grinding contours, or following a pattern, or grinding in inaccessible places such as the tines of forks. When an intricate pattern is followed, the abrasive belt is scived about $\frac{1}{4}$ " and the bare cloth remaining acts as a lead to guide the belt around sharp corners and the remaining abrasive grinds. The abrasive on a belt is fully exposed for work, increasing its cutting efficiency and reducing effort. This new grinder is adjustable 90°.

Complete information regarding the utility grinder will be supplied by writing to Dept. BB, the Porter-Cable Machine Co., 1714 N. Salina St., Syracuse 8, N. Y.

SELF-CONTAINED HOT SHOT DIE CASTING MACHINE

A new, self-contained "Hot-Shot" die casting machine, manufactured by the Robert A. Cox Co., is being distributed by the Ermac Co., 1426 So. Santa Fe Ave., Los Angeles 21, Calif. This air operated unit is useful for firms needing intermittent die casting work, but without the facilities or requirements for a regular die casting division.

This machine, needing only simple installation, measures 22" x 72" and 40" high. No specially trained technician is required to operate it, since the average shop employee can handle production runs on the Cox machine. While a complete line of repair parts is carried, any small machine shop can replace any of the equipment.

In construction, the Cox die casting machine features single hook-ups for air, gas, and 110-volt current. It is supplied complete with necessary blow torches for heating goose-neck and nozzle. Standard equipment also includes a Wilco Pyrometer, Thermo Coupler, Holding Furnace, and Venturi-type gas burner. The holding pot has a capacity of 300 lbs. of zinc alloy.

Simple operation thruout is an outstanding characteristic of the Cox machine. It is equipped with a loose type nozzle, instantly removable. All working parts are readily accessible for inspection, adjustment, or maintenance.

Buy KIPP AIR GRINDERS Because

The RPM's stay up while grinding... not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind — not just rub. The speed of Kipp air grinders drops but slightly when put to work. That means better work—longer wheel life.

Buy Kipp air tools for best results, lower prices.

MODEL JA
50,000 R.P.M.

\$33²⁵
IN U.S.A.



Weight 12 ounces;
length 6¾ inches;
chuck size ⅜ inch.
Wheel guard re-
moved for better
illustration.

MADISON-KIPP CORP.

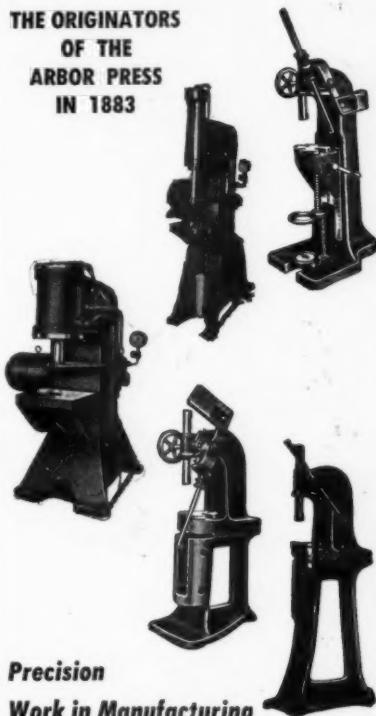
207 Waubesa St., Madison, Wis., U.S.A.

- Skilled in DIE CASTING Mechanics
- Experienced in LUBRICATION Engineering
- Originators of Really High Speed AIR TOOLS

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Precision

Work in Manufacturing

An Arbor Press for every need, ranging from ¼ to 30 tons capacity, both hydraulic and mechanical types. Write for Catalog G.

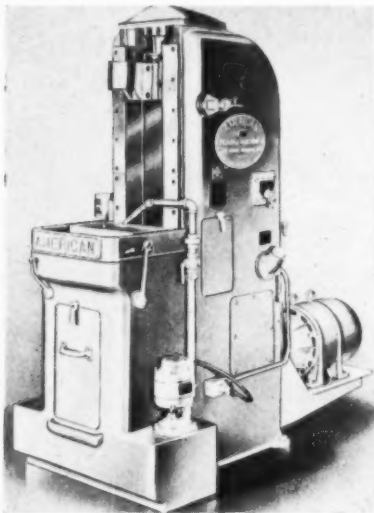
GREENERD ARBOR PRESSES

NASHUA, NEW HAMPSHIRE, U.S.A.

EST. 1883

AMERICAN VERTICAL HYDRAULIC BROACHING MACHINE

The American Broach and Machine Co., manufacturers of broaching machines and tools, and special machinery, announce changes in the design of their vertical hydraulic type T 3-way broaching machine.



Outstanding improvement has been made in the coolant assembly, while minor changes have been done in the design of the work table. The coolant is supplied from the enlarged reservoir located in the work table base by the integral motor and centrifugal pump unit (standard equipment) located on the side of the machine below the operating lever. The mounting is such that the pumping unit can be taken out by the removal of four screws and disconnecting the inlet and discharge pipes. The inlet pipe is provided with a screen to prevent large chips passing thru the pump. The coolant discharge pipe extends 8" above the work table, with the shut-off valve located at table height. The control of the coolant pump motor is thru the start and stop push button station.

The machine is manufactured in 4, 6, and 8 ton sizes, with a 24" stroke, and in 6, 10, and 15 tons with a 36" stroke. It is

adaptable to all three broaching operations—push, pull, and surface—with a minimum of changeover time; it is also used for arbor, straightening, and assembly work.

For complete descriptive information, write for a new 8-page, 3-color circular which describes the application, operation, and specifications of the complete line of type T 3-way broaching machines. Address the American Broach and Machine Co., Dept. BB, W. Huron St., Ann Arbor, Mich.

NEW POWERED ROOF VENTILATOR

Announced by the Swartwout Co., Cleveland, Ohio, is an addition to their line of industrial roof ventilating equipment—a "straight-thru" type of powered ventilator. Made in five sizes with a wide range of capacities, the new product, named the Ject-o-Valve, uses a propeller type fan to exhaust heat, smoke, fumes, etc. thru a divided top which opens and closes automatically, remaining weather-tight at all times. Descriptive bulletin No.

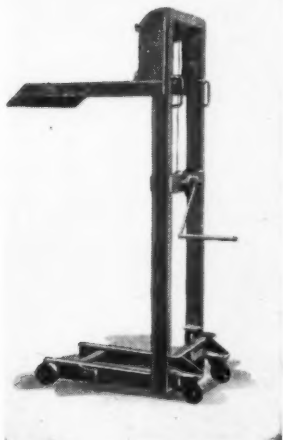


323 is available upon request to the manufacturers, 18547 Euclid Ave., Cleveland, Ohio.

Cutting tool materials have three basic qualities, but none has all three. Each type of cutting tool excels in one or two of the qualities which are room temperature hardness, "red" hardness (hardness at high temperatures) and toughness.

REVOLVATOR LIGHTWEIGHT PORTABLE ELEVATOR

Here is a new lightweight portable elevator for handling various commodities weighing up to a half ton, put out by Revolvator Co., North Bergen, N. J. This machine is simple and very maneuverable, for negotiating narrow aisles. The platform is 22" by 24" and the overall height for clearing average doorways is 68". It has a lift of 55" and a capacity of 1,000 lbs. It is equipped with a firm floor lock and swivel casters at the hoist end.



For handling castings, heavy tools, tote boxes, cases, etc., where exacting control is required, this machine is ideal. It has a crankup, crank-down hoist which allows no gravity drop. The end of the cable is readily placed either on the top of the machine for 2-part arrangement, or directly on the platform for more quickly elevating half the load. The cable may also be wrapped around a box or other commodity for bodily dragging same onto the platform by merely cranking.

This machine fills a demand for short lifts of moderate weight where electrical power is not available or where the use is too infrequent to justify the greater expense of an electrically driven machine.

STARRETT PRECISION FLAT STOCK

The L. S. Starrett Co., Athol, Mass., announces that the following types of steel are now available: (1) Oil hardening ground flat stock, which is a non-deforming, electric furnace tool steel, fully spheroidized annealed, with fine grain structure and deep hardening characteristics for precision parts requiring accuracy of size after hardening; (2) Water hardening ground flat stock, a high grade tool steel annealed for easy machining which develops maximum hardness when quenched in water or brine.

This steel is intended to expedite production of precision parts and pieces such as die parts, flat gages, drill jigs, templates, fixtures and other small parts having two flat parallel surfaces. It saves time by eliminating all preliminary roughing and precision grinding prior to machining. It is supplied in pieces 18" long, ranging in width from $\frac{1}{2}$ " to 6", and in thickness from $\frac{1}{64}$ " to 1". The two flat sides are precision ground parallel, straight, and to a tolerance of .001". The ends are machined square and the edges are ground parallel and square to the sides. Each piece is marked for size and type, and is protected by an envelope on which the size, thickness, and heat treating instructions are indicated.

Act NOW!

TO REDUCE PLANT COSTS FOR
MAINTENANCE AND REPAIR

With the TORNADO

Can be used in your plant to remove dirt, dust, metal scrap, filings, and similar debris. Motor-fan unit removed quickly to become a CONVENIENT HAND BLOWER — cleans interior, hard-to-reach parts of motor and other moving equipment. WRITE TODAY FOR LITERATURE OR FREE DEMONSTRATION.

**BREUER
Electric Mfg. Co.**

5118 N. Ravenswood Ave., Chicago 40, Ill.



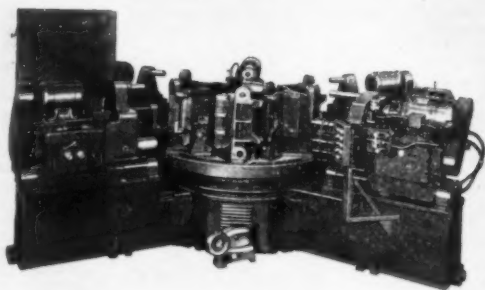
TORNADO
HAND BLOWER

SNYDER SPECIAL HANDLES 22 MACHINING OPERATIONS

Twenty-two machining operations are performed on cast iron steering gear housings in this special automatic machine designed and built by Snyder Tool & Engineering Co. of Detroit, Michigan. Drilling, boring, chamfering, spotfacing, reaming and tapping operations formerly handled on separate machines are combined efficiently in a completely automatic cycle.

The Work-holding fixtures are mounted on an electrically driven, automatic, six-station Geneva index table, and housings are machined by five self-contained Snyder machining units. One housing is completed every fifty seconds. Parts are clamped manually.

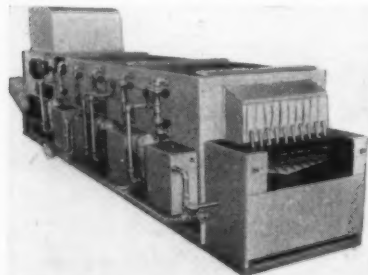
Both high speed steel tools cutting at 90 f.p.m. and tungsten carbide tools cut-



ting at 240 f.p.m. are employed. Boring tools are flange-mounted, and drills and reamers are held in adjustable adaptors. The base is welded steel, well ribbed and normalized. Multiple heads are lubricated by a gear pump and pressure system.

OPTIMUS INTRODUCES FLAT CONVEYOR METAL WASHING MACHINE

The No. WRDXHCF Optimus Flat Conveyor Type Washing Machine, which cleans and processes metal parts prior to plating has just been introduced by Optimus Equipment Co., 157 Church St., Matawan, N. J., engineers and manufacturers of metal cleaning and drying equipment. The new machine handles a sequence of related operations in seven consecutive stages: Hot Alkali Wash, Drain, Hot Water Rinse, Warm Cyanide Wash, Cold Rinse to Sewer, Hot Rinse, Dry.



The entire operation takes metal parts directly from processes, such as polishing

and feeds directly to the plating machine. The two hot rinses are hooked in sequence, thus effecting a further operating saving. The conveyor can also be built with flight bars for baskets and individual pieces, or with a mesh belt for any type of parts in bulk, or individual pieces.

Overall size of machine is 35' in length, 6' in width, and 7' in height. The belt speed of four feet per minute for a production in excess of 100 parts per minute, however, it can be adapted to a wide range of speeds and types of treatment.

HEAVY DUTY OVERHANG BUFFER

The Bradford Machine Tool Co., Dept. BB, Cincinnati 4, Ohio announces a new heavy duty overhang buffer, especially adapted to work requiring maximum clearance. Designated as Model 660, the buffer is belt driven by a ball-bearing motor, with an adjustable motor platform. The design permits drive belts to be changed without removing the housing from the shaft; the machine is equipped with positive shaft lock, magnetic starter, overload protection, and under voltage release. It is produced in a power range of from 3 to 20 hp, with a speed of 2400 rpm; the motor specifications are 220/440 or 550 volt, dual or triple phase, and 50 or 60 cycles.

ZERO PRECISION ADDED TO SHELTON LATHES

The Sheldon Machine Co. Inc., Chicago machine tool manufacturers, have developed an addition to their "S-56" series of lathes, widely used during the war in machine shops, instrument repair shops, and on several types of fighting ships.

The new S-56, which is designated as the TRB S-56, uses for the first time in a moderate priced lathe, "zero precision" tapered roller bearings. To accommodate the large zero inspection bearings, the headstock has been redesigned, eliminating bearing caps, and changing to a larger and solid housing. With these alterations, plus its 11¼" swing, 1" collet capacity, and a 1½" hole through the spindle, this lathe has built-in accuracy for the most exacting requirements, according to its manufacturer.

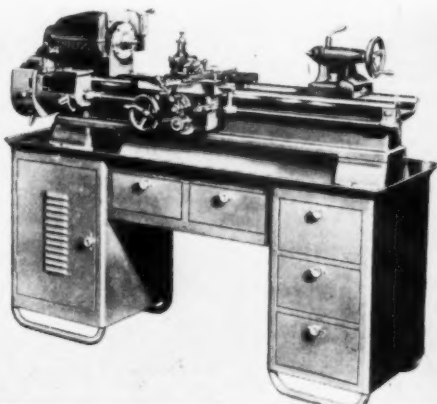
The Sheldon TRB S-56 is supplied mounted on a heavy metal cabinet which houses a 4-speed V-belt underneath drive, with double V-belts to the spindle. The lathe bed is 56" long, and extends 35" between the centers. Check tests have been completed, and the lathe is now in production, and is on display by distributors.

Additional information concerning the TRB S-56 will be supplied by the Sheldon Machine Co., Inc., 4258 N. Knox Ave., Chicago 41, Ill.

MICROMATIC HONE EXPANDS

To obtain increased efficiency, and to improve working conditions, Micromatic Hone Corporation is erecting a 35,000 square foot addition to its present building at 8100 Schoolcraft, Detroit. The new addition will house all heavy machining and job honing operations, required by the company's development of its new line of honing machine tool equipment.

The building will be modern "Tre-form" construction; with maximum possible light and ventilation control. Austin Company, the builders, broke ground early in March.



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for Every
Industrial
Purpose**

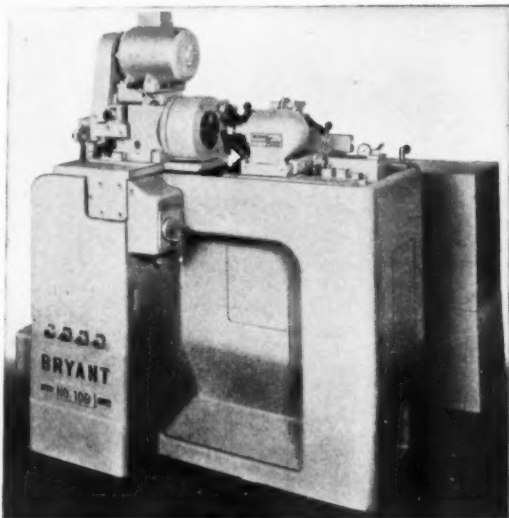
GROBET FILE CO. of AMERICA
421 Canal Street New York 13, N. Y.

BRYANT AUTOMATIC INTERNAL GRINDER

The Bryant Chucking Grinder Co. announces a new automatic internal grinder, particularly designed for the high production grinding of bore diameters from $\frac{1}{4}$ " to 3", up to 4" deep. Designated as the No. 109, the grinder will swing work up to 9", and is suitable for such jobs as gears, bushings, and other small parts which can be produced most profitably in large quantities. The most important feature is the hydraulic and electronic control arrangement that provides for completely selective, variable cycles. This provides for split-second timing of all grinding and truing actions, and minimizes idle time.

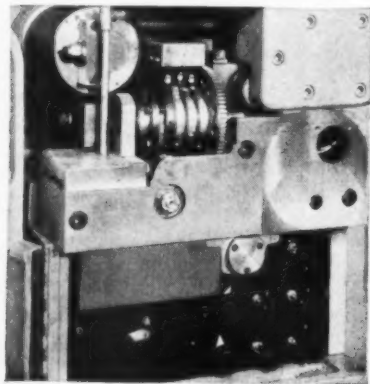
The machine is designed so that the full grinding cycle proceeds automatically and operator attention is required only for loading and unloading the work and tripping the valve to start the cycle, consisting of rough grind, true wheel, finish grind, and return to chucking position as the finish size is reached.

To assure maximum production and extreme precision, many new features have



been incorporated into the design of the No. 109. The Bryant principle of cylindrical slide construction has been basically retained. The adaptation of preloaded ball bearings to both longitudinal and cross slides affords the utmost precision and rigidity under all conditions, assuring accurate control and freedom of motion of the slides.

By providing d-c motors (built in rectifiers allow the use of a-c power) to supply driving power to the cross feed and the drive spindle, a large number of feeds and speed is available. The feed controls consist of 3 adjustable cams, and 5 rheostats to provide extreme flexibility of adjustment and ease of setup. The cams operate limit switches to control the rate of feed by the d-c motor drive. These cams are easily set to increase or decrease the rate of feed at any position in the grinding cycle. Each of the rheostats provides independent control of the various positions of the cycle. Three control various speed rates for rough grinding, the other two for finish grinding. In addition, two electrical timing devices may be adjusted to provide the desired length of "spark out" for both rough and fin-



ish grinding. An adjustable "back-off" stop can be set so that the feed backs off only the amount required for particular stock removal of the part to be ground, if further speed of grinding is desired.

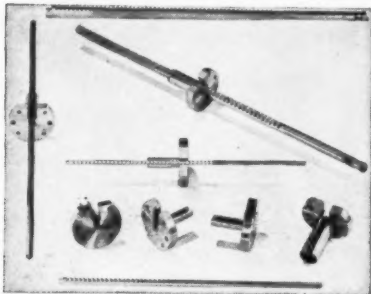
The main wheel slide traverse is operated hydraulically and four individual throttles allow the pre-selection of the best traverse speed for quick approach, rough grinding, wheel truing, and finish grinding.

The model 109 uses a high-frequency wheelhead unit. With this drive, wheel speeds up to 100,000 rpm can be attained to assure the efficient surface speeds for small bores. Provision has also been made for a balanced, belt-driven wheelhead, giving speeds from 200 to 2400 rpm.

Further information regarding this new grinder may be secured by writing to the Bryant Chucking Grinder Co., Dept. BB, Springfield, Vermont.

ZAGAR STANDARDIZED BROACHES AND ADAPTORS

Zagar Standardized Key Broaches and Adaptors, engineered for use on the Zagar 20" Horizontal Broaching Machine, in sizes from $\frac{1}{8}$ " to $\frac{1}{2}$ " are now obtainable. These tools are correctly designed, accurately machined, and properly hardened and precision ground by Zagar broaching specialists, to assure standardization and precision. They are automatically positioned to cut to proper depth by horn-type adaptors, fitting into the pocket of the face plate.



A change in set-ups can be accomplished in five minutes by the selection and installation of the proper adaptor which suits the bored hole in the part to be broached. Horn-type sizes from $\frac{1}{4}$ " to $1\frac{1}{4}$ " may be obtained from stock. For further details, call the local Zagar dealer, or write to the Zagar Tool Co. Inc., 23,880 Lakeland Blvd., Dept. BB, Cleveland 17, Ohio, for Bulletin No. MT-3.

ADJUSTABLE WING-TYPE HOLE CUTTER

An improved, adjustable hole cutter, of the 2-wing type, has been introduced by the manufacturers of the Circo fixed diameter wheel and hole cutters. Simplicity and stability are features of the new cutter for wood, plastics, plywood composition board and light metals.



The body or shank of the tool has a square head with precision machined channels to accommodate the cross arms. The cross-arms, also, have slots which hold the tool-steel blades in exactly the right cutting position. Hexagon flanged bolts are used to lock the cross-arms and tool bits firmly into position. The head will accommodate either a pilot or center drill so that center hole of proper size may be drilled at the same time the circular piece is cut. Pilot or center drill is held in place by a hollow-headed set screw in the square head of the shank.

Simplicity of adjustment is an advantage of this new tool. Both cross-arms have accurate scale markings at $1/16$ " intervals to simplify setting up the tool for cuts of varying diameters. This feature eliminates time ordinarily lost in adjusting cutters of this type. The tool will cut circles or holes from 2" to 8" in diameter in materials up to 1" thick. It may be used in any standard size of power driven drill press, either bench or pedestal type, fits any standard $\frac{3}{8}$ " or $\frac{1}{2}$ " chuck.

For further information on this new cutter, write Circo Tool Co., 617 N. 2nd St., Milwaukee 2, Wisconsin.

CERWECO STEEL APRON BRAKE

NOW AVAILABLE IN
6 AND 8 FT. 14 GA.
10 FT. 16 GA. CAP



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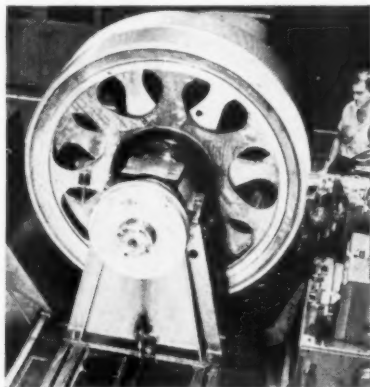
**WM. C. JOHNSON &
SONS MACHY. CO.**

1211 Hadley St. St. Louis 6, Mo.

SHAVING MAKES BETTER GEARS, QUICKER

Marine-gear engineers have taken a lesson from automotive and air-craft gear people and used gear shaving as a method of providing a better finish on the gear teeth. The idea of taking a thin slice (a few thousandths of an inch) from the surfaces of teeth after they have been formed by hobbing, which has worked well on small gears, has been applied by Westinghouse engineers at the South Philadelphia Steam Turbine Division to the big gears eight feet in diameter and capable of transmitting several thousand horsepower as used for aircraft carriers.

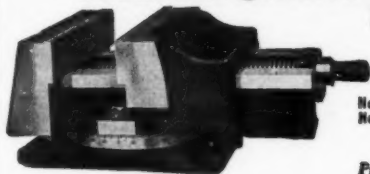
Gear shaving removes feed marks and other surface imperfections left by the hobbing machines. After considerable development of the shaving technique it has become possible to obtain full-face contact without recourse to lapping or other means. Furthermore, hobbing feeds and speeds have been increased as much as 50 percent without sacrifice of accuracy but with a somewhat rougher surface finish that can be corrected by shaving. The resulting shaved tooth surface has about



twice as fine a finish as the best hobbled surface even at slow hobbing speeds.

Wilkinson, about 1780, originated a boring machine, after much prodding by James Watt, to bore out the cylinders for James Watt's steam engine.

SUPERIOR QUALITY AND WORKMANSHIP IN PLUNKET VISES



SQUARE BASE SHAPER VISE

The Shaper Vise has graduated swivel base and tongue in center to fit slot in table, and has holes for bolting down. In ordering this vise give size of slots in Shaper Table, also distance from center to center of slots.

No. 48, 10" jaws, 2 1/4" deep, opens 8 1/2". Weight 125 lbs. **\$62.40**

No. 4, 6" jaws, 1 1/2" deep, opens 5". Weight 45 lbs. **\$45.60**

Our complete line includes Vises for Drill Presses, Milling Machines, Shapers and Grinders.

Prices are net, f. o. b. Chicago. Write for illustrated folder today. Dealers inquiries solicited.

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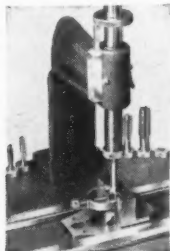
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and Threader (Single Spindle)

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"IT MEASURES AS IT TAPS"

Taps twice as many holes, quicker than with a tap wrench. Always right angle holes. Tap capacity 1/8" thru 1".



DEPTH GAUGE. An exclusive patented Lassy feature. Always shows depth tap has traveled.

TAP ADAPTERS. No extra spindles needed. Change taps in a jiffy.

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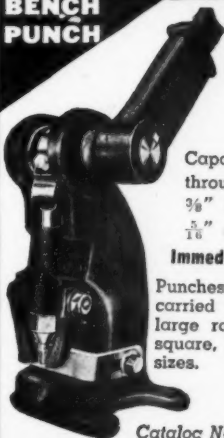
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HANDY**

Capacity: 7/8" hole through 1/4" steel or 3/8" hole through 5/16" steel.

Immediate shipment.

Punches and dies are carried in stock in a large range of round, square, flat, and oval sizes.

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American Pioneers—Twenty-three years. Give diameter, length and shape of cavity.

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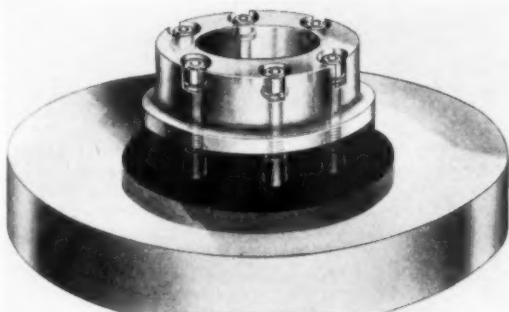
MACHINEABLE INSERTS IN CARBIDES PERMIT THREADING

A development announced by Carboloy Co. Inc., enables carbide parts to be mounted or attached with screws, studs, etc. in the same manner as similar parts made of softer or ferrous metals. Heretofore, use of large sections of carbides has been handicapped by the fact that in the hardened state, carbides are unmachineable to all practical purposes, and cannot be drilled or tapped. Now, machineable materials are solidly imbedded in the carbide parts wherever the part is to be threaded.

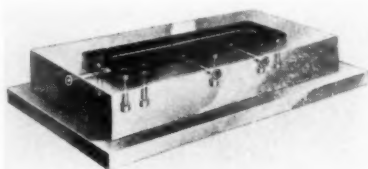
Among the variety of potential applications which exist, are such items as compound, progressive, and segmental dies, particularly where blanking is done; wear parts in fixtures; crank guides; cams; machine ways, guides, work rests and shoes; wear plates on precision instruments.

Where expansion problems are involved, attaching carbides with screws, bolts, etc. has further utility. For example, the holes in the support member may be countersunk and made slightly larger than the bolt diameter. The bolts can then be screwed into the threaded carbide, and spring loaded. This would insure firm seating of the carbide, yet it allows for creep in case of differential expansion. At the same time, the wear surface of the carbide can be solid and unbroken.

Repeated tests have demonstrated that the maximum pull exerted in tightening



the screw, bolt, or stud, does not pull out the metal, nor damage the threads. The bolt will fail in tension before it will either pull the metal or injure the threads.



Further information may be secured by writing to the Carboloy Co. Inc., Roosevelt Park Annex, Detroit 32, Mich.

BENCH TYPE BUTT WELDER

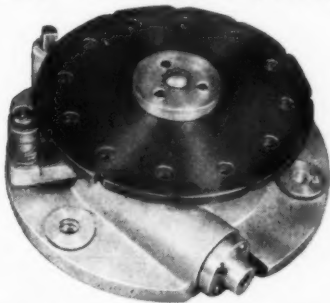
Announcement is made of a bench type butt welder by the Banner Products Co., 4937 N. 29th St., Milwaukee 9, Wis. Designated as model 10 KVA, it is supplied for either 220 or 440 volt, 60 cycle current. Features include eight ranges of heat, round steel guides for movable platen in oilite bushings, ample grease outlets, and a built-in tap switch. The bronze head is water cooled and has electrical conductivity; the transformer is water cooled, with an asbestos shield.

Perfect alignment and precision workmanship are assured thru the use of a 2"

diameter air block on clamping jobs; the blocks maintain a constant pressure on material being welded. Operation is actuated by a foot switch connected to a 4-way solenoid air valve which positions the clamps. The movable platen has a left hand lever with a pilot switch connection which closes to apply the current at the joint; simultaneously the hand lever is pulled toward stationary platen for up-set. The current is automatically shut off by an adjustable limit switch. Air line equipment is included with the machine.

ALLEN DIAL FEED TABLE

The A. K. Allen Co. has developed an air-operated Dial Feed Table as an attachment to a punch press, drill press, or milling machine. It requires only a single cam and a 3-way valve for operation. According to the manufacturers, this new



accessory is a versatile unit, its range of usefulness limited only by the ingenuity of the user. The feed table operates by compressed air thru a 3-way air valve moving a piston to activate the pawl

arm. The pawl indexes the table, and locks it in position until the valve is released, which allows a spring to return the pawl for the next indexing position.

For use on a drill press, for example, this useful appliance is set up as follows: a 3-way normally open valve is mounted so that it is actuated by the upstroke of the spindle. Multiple drill heads may be used to perform a number of drilling, tapping, or reaming operations on a piece. A retainer may be required to prevent the piece from rising with the drill or tap. The index plate rotates on top of a steel rider plate. Often the piece part can be set into a thru hole in the index plate, being retained by the rider plate during the drilling operation. Ejection is managed by drilling a hole in the rider plate thru which the finished piece can fall.

Further information on the various uses of the Dial Feed Table will be supplied by the A. K. Allen Co., 3011 Fort Hamilton Parkway, Dept. BB, Brooklyn 18, N. Y.

A lathe originally turned round pieces of metal to the diameter of small broom handles. Then some ingenious mechanic elaborated upon the lathe, enabling it to turn metal bars the diameter of locomotive wheels.



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May also be used for Evaporative Coolers, Fountains, Displays, etc.

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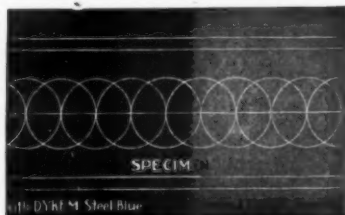


Evaporative Cooler Kit
This kit provides all of the essentials for Evaporative Cooling: Pump, Hose, Valve and Switch.
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Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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FLUORESCENT FIXTURE CAN BE CLEANED FROM FLOOR LEVEL

The new Hinged-Glass Aristolite, announced by the Edwin F. Guth Co., offers a new kind of maintenance, so quick and easy that the fixture can be cleaned from the floor level. A handy servicing tool is used to clean the Hinged-Glass Aristolite. One end of the tool is a simple fixture for opening and closing the glass panels; on the other end is a duster for cleaning the Aristolite.

The exclusive hinging feature of the Aristolite's glass diffusers also saves many steps and lost motion in servicing the unit. The diffusers are swung open and are held securely on the Luminaire while installing new lamps. Trips up and down ladders are eliminated, and the hazard in handling glass panels is avoided.

In addition to low-cost maintenance, Guth Hinged-Glass Aristolites provide good diffused illumination; they are available in 2, 3, or 4-40 watt sizes. They can be arranged individually or in continuous rows and mounted direct to ceiling or suspended on hangers. Further information will be supplied by the Edwin F. Guth Co., Dept. BB, 2615 Washington Ave., St. Louis, Mo.

DANCO NYLON CABLE

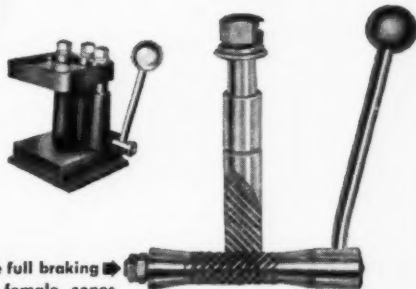
A completely new product combining great strength, flexibility, wearing qualities, and beauty, is the Danco Nylon Cable. Available now in two sizes, 6/32" and 7/32", both have a 3/32" aero steel wire rope core, of 920 lbs. break test, impregnated onto which is extruded Danco Nylon. One of the many exhaustive laboratory tests for Danco Nylon Cable employs one-inch pulleys and guides. The cable withstands 320,000 flexings before the steel core breaks, and 410,000 before the nylon severs.

This new product is claimed to be highly resistant to oils, acids, moisture, salt water, friction, and fire. It will not fray, rust, or rot, but remains clean and smooth.

With its exceptional qualities of fatigue and abrasion resistance, strength, flexibility, cleanness and beauty, Danco Nylon cable has many industrial applications. It is the product of extended laboratory research by the maker and two years development with E. I. DuPont de Nemours. On manufacturers' specifications, DuPont compounded a special formula Nylon which provided a flexible, abrasive resistant material. The product is made by the Danielson Manufacturing Co., Danielson, Conn.

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The Woodworth "CONE-LOK" jig utilizes the full braking power of its perfectly mated male and female cones.

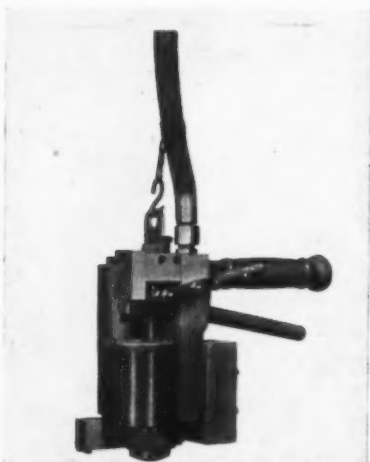
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NEW METAL SPRAY GUN



A metal spray gun that melts and sprays low melting temperature alloys is

now being marketed by the Metaloy Sprayer Company, of New York. A self-contained precision type sprayer, it can be used for either intermittent or production spraying and is designed to provide close control of the amount and characteristic of the spray.

The sprayer has been used in selenium rectifier cell manufacturing for applying a finely atomized surface of sprayed metal, as well as in the precision casting field, coating patterns and core boxes in foundries, the production of molds and producing parts for electroforming.

Because of the design of the stainless steel melting pot, intermittent spraying without emptying the pot during off periods is possible. Metal or alloys in stick form are inserted in the pot thru the guide ring and feed down as it melts. Metal and alloys can also be inserted in the gun by using ladle and funnel. Further information will be supplied by the Metaloy Sprayer Co., Dept. BB, 135 Liberty St., New York 6, N. Y.

Maudslay in 1779 invented a screw cutting lathe.

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POWER AND FOOT OPERATED

For riveting, staking, stamping and similar operations on small light parts. Constructed to compensate for variation in thickness of the work and to deliver a **UNIFORM BLOW AT EVERY STROKE.**

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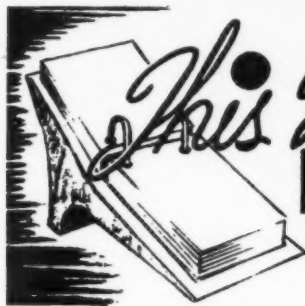
THE TAYLOR & FENN CO. HARTFORD 1, CONN.



M-110 (illustrated) motor driven to eliminate fatigue factor of foot operated press—similar press M-130, equipped to operate by compressed air.

OTHER T & F MACHINES

Duplex Spline Millers — Medium Duty and High Speed Sensitive Drilling Machines.



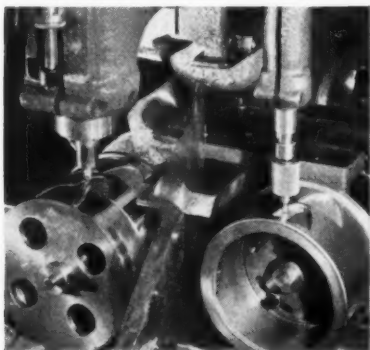
This Month's **INDUSTRIAL FILMS**

AN EXACT DUPLICATE

George Gorton Machine Co.
Racine, Wisconsin.

30 minutes. Full color. Sound picture. 16 mm. Obtainable from George Gorton Machine Co.

This is a film applying to those interested in die making, mold making, production profiling, die casting, plas-



tics, glass, rubber, etc. It provides information on adaptability of Gorton tracer-controlled equipment, and is both educational and promotional.

Highlights from the film include brief

history of tracer-controlled machine tools, production profiling with fast ways to produce short runs, and multiple etching, showing rapid marking of hardened parts in finished state. Subject of contour grinding covers method of precision grinding of irregular shapes at air spindle speeds up to 75,000 rpm and milling and grinding on one machine from one master, one set-up. Die, hob making and tracer-control duplicating are also presented.

The film is available to any responsible department head or executive, upon written request on company letterhead. Request should be made to the George Gorton Machine Co. about a month before film is desired and three tentative dates suggested.

EVERYDAY MIRACLES

Carboloy Company
Box 237, Roosevelt Park P. O.
Detroit, Mich.

25 minutes. Black and white. Sound. 16 mm. Obtainable from Modern Talking Picture Service of New York City, N. Y.

This promotional-educational production is designed primarily to familiarize carbide users with carbide progress, but



PORTABLE PUMP UNITS

*Use these compact
self-contained units as*

Coolant Systems for all types of Machine Tools.

Stand-by Pump Units in case your built-in pumps fail.

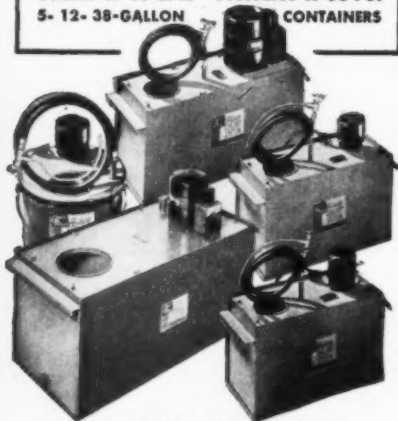
Automatic Die or Stock Lubricators on punch presses.
(Ideal for coil stock)

For hundreds of special applications—circulating or applying liquids of many kinds.

GEAR and CENTRIFUGAL PUMPS

Volume to 43 GPM—Pressures to 50 PSI

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GRAY-MILLS CORPORATION

1945 RIDGE AVENUE
EVANSTON, ILLINOIS

the non-technical treatment of the subject gives the film a broader appeal.

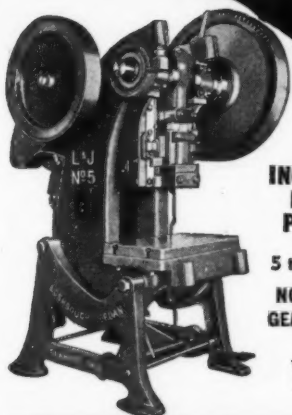
The picture opens with a young couple on tour of a Chicago manufacturing plant, who become separated from a group and wander into the office of the company's metallurgist. Here, as the young lady rests her feet, the metallurgist tells the couple the story of the hard metal carbides. He interprets the growth and development of the industrial methods which have been made possible by the adoption of carbide tools, dies and other products. Montages and clever angle shots depict the innovations



in products and manufacturing processes. The picture ends on a prophetic note as the metallurgist hints at possible future applications of hard metal carbides, especially in consumer goods.

Addison Richards, veteran Hollywood character actor, plays the role of the metallurgist, and Beverly Taylor and Les Podewell, a Chicago pair experienced in radio and television, play the young couple. Comedy is injected into the film by a not-too-bright plant guide, played by George Cisar, ex-night club master of ceremonies and Chicago radio personality.

Standard Since 1911



INCLINABLE POWER PRESSES

**5 to 79 tons
NO. 5 BACK
GEARED TYPE**

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successors to Lashbough-Jordan Tool & Machine Co.
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★ **THE WONDER CUTTER**

The lowest-priced wire and rod cutter on the market. The hardened cutters last indefinitely.

Hand operated. A giant for work, cuts wire and rods up to 3/8-in. round or 3/8-in. square and band iron up to 1/2 in. by 2-in. Adjustable stop for repeated cuts to same length. Large or small, your shop can use a WONDER CUTTER.

Write today for prices.

THE FEDERAL FOUNDRY SUPPLY CO.

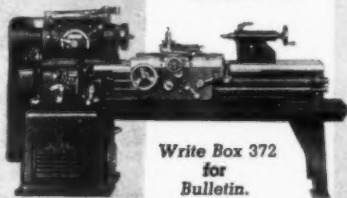
4602 East 71st St., Cleveland, Ohio



CARROLL AND JAMIESON LATHES 15" AND 16"

12 Speed Geared
Head Motor Drive
Timken Mounted
Spindle.

Modern Design—
Liberal
Dimensions.

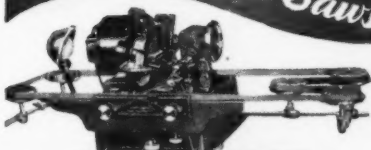


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Recondition ★ Old Saws



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• HACK SAWS
• BAND SAWS
• CIRCULAR SAWS
• MEAT SAWS

HOWE AND SON Inc. HINSDALE N. H.

SURFACE BROACHING

LaPointe Machine Tool Company,
Dept. W-40, Hudson, Massachusetts.

*17-18 minutes. Black and white.
Sound. 16 mm. Obtainable from La-
Pointe.*

The Lapointe Machine Tool Company, manufacturers of broaches and broaching machines, recently completed a colored sound film, entitled "Surface Broaching." Running approximately 17-18 minutes, this 16 mm. film gives a graphic demonstration of how surface broaching is accelerating the production of many everyday products. The wide range includes loom frame ends, flat iron bases, automobile bearings, wrenches, pliers, and automobile cylinder blocks. The handling of a problem concerning cylinder blocks is interestingly shown.

This film is most informative, demonstrating how surface broaching adapts itself to meet the many demands made upon the machine industry today. It very clearly shows the important role which broaching plays in modern machining. Many of the scenes were taken on the job in several of the country's finest industrial plants.

This film is available for exhibition to interested groups and may be accompanied by an address on broaching by Lapointe's Chief Engineer, Kenneth N. Macomber. For further information, write Dept. W-40, Lapointe Machine Tool Company, Hudson, Massachusetts.

STURGIS ROTO-FINISH

Roto-Finish Mechanical Finishing metal parts is illustrated and described in an attractive 2-color folder just published by The Sturgis Products Co., Sturgis, Michigan.

The new folder shows the different types of metal stampings, die castings and other parts and products most conducive to mechanical finishing by Roto-Finish; likewise these illustrations indicate the quality of finish produced. Case studies

of Roto-Finish users describe operation time, cost, and man power savings.

The complete line of Roto-Finish machinery and equipment is shown, listing the improvements in design and what they accomplish in increased productivity plus higher quality at lower costs.

For copies of the new Roto-Finish Booklet, write to the Sturgis Products Co., Dept. BB, Sturgis, Michigan.

MINIATURE BALL BEARINGS

New four page bulletin on miniature ball bearings for precision instruments and mechanisms, describes in detail five series—radial, super-light radial, pivot, angular contact and thrust.

Complete specifications are given including load ratings recommended for average typical requirements. Applications cover wide temperature ranges, and as components of such items as cameras, compasses, meters, fractional hp motors, telephone equipment, winding machines, etc. Engineering service is offered as well as facilities for design and production of special ball bearings.

Card to Dept. BB, Miniature Precision Bearings, Inc., Keene, N. H., will secure free copy.

STEWART SHAFTING

The F. W. Stewart Mfg. Corporation, 4311 Ravenswood Ave., Chicago 13, have issued a bulletin on their new Power Drive Circle Ess Flexible Shafting. Diversified streamlined power transmission is offered for use in all types of metal, plastics, porcelain or wood work. Three types of power drive flexible shafts are presented—for heavy, medium and light duty in commercial or industrial work. Also a high speed, light weight flexible shaft kit is offered to meet the demand for a wide range and quick change of speed.

For free copy drop card addressed to Dept. BB at the above address.

Wholesalers are buying more surplus war property than any other group with manufacturers and other industrial users next and veterans in third place, WAA revealed. Of the surplus sold during the winter months, wholesalers bought 33 percent, manufacturers and other industrial users acquired 29 per cent, and veterans took 21 per cent. Much of the property bought by veterans is being used by them to establish their own businesses.

Available LITERATURE

HOBART CO. SPONSORS ARC WELDING SCHOOL

A new 24-page pictorial booklet, "Learn Arc Welding" has been published by the Hobart Trade School, Inc., sponsored by The Hobart Brothers Company, manufacturers of welding equipment and electrical machinery.

The booklet points out the various uses to which arc welding can be applied in industry or private business.

The Hobart Trade School is a fully accredited, non-profit institution. The tuition pays only cost of instructors and materials. It is now operating under contract to the Veterans' Administration, but its facilities are available to all interested in learning. Instruction is divided into four steps — explanation, demonstration, supervision and practice.

The booklet may be obtained by writing Dept. BB, The Hobart Brothers Company, Hobart Square, Troy Ohio.

MONARCH SHAPEMASTER

Monarch Machine Tool Co. of Sidney, Ohio, manufacturers of turning machines, are presenting a 20-page booklet describing operation and products of the universal Monarch Shapemaster.

Monarch describes the Shapemaster as a lathe which transmits any desired shape to either the outside or inside diameter or face of a piece of work. Squares, hexagons and octagons with square corners can be turned and bored.

Large photographs illustrate the booklet, showing examples of the machine's work and also shows, from various angles, the machine in action. Among demonstrations is the making of an oval, fluted die with a spiral design on the bottom and a tapered fluted shape. Two pages are devoted to seven examples of inside and outside work, which suggest the almost limitless variety of shapes possible.

The booklet may be obtained by writing Dept. BB, The Monarch Machine Tool Company, Sidney, Ohio.

ADAMAS CARBIDE PRODUCTS

A revised price list and catalog is available for distribution by the Adamas Carbide Corp., 1819 Broadway, New York 23, N. Y.

Features of the publication include standard styles, sizes and tolerances for blanks recently adopted by principal tungsten carbide manufacturers, together with a simple method of computing prices on non-standard blanks.

Also covered are standard and special grade designations, their applications and Rockwell hardness, and new "in-stock" standards available for immediate delivery. Prices are also quoted for the various items.

A card addressed to Dept. BB, Adamas Carbide, will bring catalog to anyone making request.

VULCAN TOOLS

A new 48 page catalog marks the 52nd year in business of manufacturing tools for the stone cutting and contracting trades for Vulcan Tool Manufacturing Company. For the convenience of their customers, they have prepared a telegraph code covering principal matters relating to shipments, orders and terms. The use of the code in conjunction with the catalog number of the item requested will simplify the transmission of telegrams and save expense of lengthy messages.

Trade customs listed are the usual rules of procedure in business transactions. The catalog is divided into two parts, one part on hand tools, the other on pneumatic tools. In addition to their established standard line, Vulcan now offer Super-Service Moil Points and Chisel Bits. Dimensions, specifications and pictures of all the tools are present, and each tool is displayed to good advantage in the catalog.

The catalog has also been equipped with an index for ease in finding desired items.

Catalog may be obtained from Vulcan Tool Mfg. Co., Quincy, Mass.

MELIN END MILLS

A 74-page catalog has been issued by Melin Tool Co. of Grand Rapids, Mich., for the information of the machine tool trade. The catalog lists their complete line of standard tools which are carried in stock for immediate delivery and also those special types of end mills manufactured to meet individual requirements of customers.

End mills, drills, countersinks, cutters, etc. are all listed in the catalog, together with specifications and prices.

DEEP-HOLE DRILLING

Are deep holes a problem in your shop?

Let us do these troublesome jobs for you on our special gun drilling machines. Smooth straight holes from 3/16" to 1 1/2" in diameter—drilled to any depth.

Send us your part prints for estimate.

CONNER
TOOL & CUTTER COMPANY
(DEEP-DRILLING DIVISION)
1000 East McNichols Road
Detroit 3, Michigan

The catalog devotes about half of its space to two flute, three flute, and four flute end mills, dividing them into types such as ball end, square nose, ball nose, double and single ends, long, extra long, small diameter, etc. The wide assortment includes right and left hand spiral mills with left and right hand cut, having double back-off clearance and flat shanks for set screws.

The three flute end mills are the result of extensive research. The use of three flute mills eliminates strain on the spindle experienced by the use of two lip mills—at full cutting depth of the tool, two flutes are always in the cut. Cutting is closely controlled because it disposes of the chips efficiently. All decarburized metal is ground off.

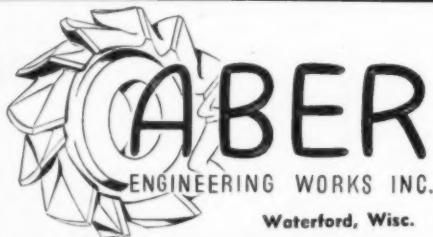
Anyone desiring further information may acquire a catalog without charge by writing to Dept. BB, Melin Tool Co., 3370 W. 140th St., Cleveland 11, Ohio.

SORENSEN REGULATORS

As explained in their catalog (15 pages), Sorenson Regulators are applicable to industries, laboratories, sound recording equipment, radio, radar, television, portable testers, etc.

Their principle of operation is explained over several pages, together with diagrams two of which depict graphically how voltage output may be stabilized. Pictures of models and specifications are shown in detail. The Sorenson electronic laboratories are publicized on one page, and are equipped to meet standard and special voltage regulator needs. They welcome questions from companies.

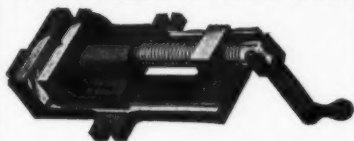
Catalog may be obtained from Dept. BB, Sorenson and Company, Inc., of Stamford, Conn.



**Curved Tooth Milling
Cutters - Grip-All Saw
Vise - Aber Cherrying
Attachments.**

Write for literature.

YOST DRILL PRESS VISE



This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

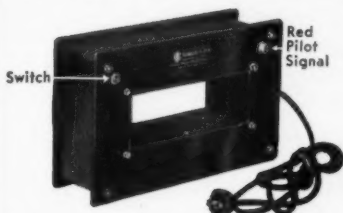
Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	3½	12½
2D	5	5½	23

Do you need a vise of ANY type?

Write today for bulletins on the extensive Yost line

YOST MFG. COMPANY
1335 SO. MAIN ST.
MEADVILLE, PENNSYLVANIA

AMC *Quick* DEMAGNETIZER

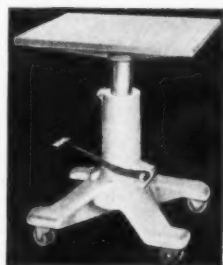


A necessity where machine tools are used.

Standard units available and special sizes to order.

Write today for descriptive circular.

ALOFS MFG. CO.
1629 Madison Grand Rapids, Mich.



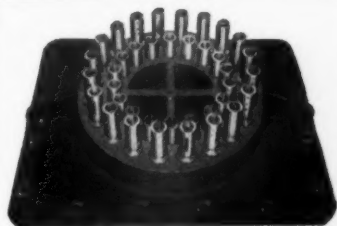
SAVE Labor and Time

Eliminate heavy lifting. Cut handling costs. Table

swivels and locks in any position. Can be varied 15½" by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

Send TODAY for illustrated catalog No. 2.

MIDWEST TOOL & ENG. CO.
112 Webster St., Dayton, Ohio



Pictured: a 30-Spindle Heavy-Duty Drill Head.

DESIGNERS AND MANUFACTURERS OF MULTIPLE DRILLING EQUIPMENT

We invite your inquiry.

MICHIGAN DRILL HEAD CO.
971 E. 8 MILE ROAD HAZEL PARK, MICH.

Power Facing and Boring with ONE Tool Head

CHANDLER DUPLEX

- 1 All operations in one set-up.
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- 3 Power feed engaged and disengaged instantly.
- 4 Adjustment for boring made in increments of one-tenth.
- 5 Cutting bar takes any position in Tee Slot of Slide.
- 6 Power feed for facing assures smooth, uniform movement of tool across work.
- 7 Any style shank available. Shanks are interchangeable.

Precision Constructed: feed screw and worm gear ground from solid; bronze feed nut and bushings.

Write for complete information.
Profitable territories open.
Prompt Delivery.



**STANDARD
MODEL "D"**
Slide Travel 1"
Boring Capacity 8".

**HEAVY DUTY
MODELS**
3 sizes of slide travel 2-1/2", 3-1/2", 4-1/2"
Boring Capacity 2 5/8".

CHANDLER TOOL CO.

514 OHIO AVE., MUNCIE, IND.

NELCO CUTTING TOOLS

Nelco Tool Co., Inc. has revised its catalog and announced that it is ready for distribution to the trade.

Illustrating and describing the entire line of Carboly-tipped cutting tools manufactured by this company, the catalog contains recommendations for operation and maintenance of Nelco tools, a simple conversion chart, best resharpener procedures, etc., together with prices on the various tools they offer.

A copy of this new catalog may be obtained by writing to Dept. BB, Nelco Tool Co., 370 Hamilton Ave., Brooklyn 31, N. Y., or by contacting any of the company's jobbers.

RUSSELL & STOLL FLOOR ACCESSORIES

"Floor Boxes and Accessories", a new 12-page catalog just issued by Russell & Stoll Company, Inc., 125 Barclay St., New York 7, N. Y., is available upon request. New items are included in this catalog which fully describes and illustrates all types of watertight floor boxes and receptacles, combination floor extension sets, floor outlet type receptacles, heavy duty floor receptacles, plugs, and associated accessories. Write for catalog FB147-34

ALNOR PYROMETERS

Two catalogs are available from the Illinois Testing Laboratories, one a 12-page catalog, No. 4257, describing the Type 4000 Portable Alnor Pyrocon and the other, a 16-page, No. 4361, describing Alnor Pyrometers suitable for measurement of Diesel engine exhaust temperature and general industrial use in air preheaters, heat treating furnaces, etc.

The portable Pyrocon is designed for use in plastic molding, die casting, electrical appliance, and other manufacturing operations, as depicted in a series of pictures. It is mounted in a case for protection and the handle is offset on the case to equalize weight balance of the instrument. Alnor thermocouples for use with the portable Pyrocon are also described.

Catalog No. 4361 breaks the Pyrometers available for heavier stationary industrial uses down into the types and tells uses for which each is best suited.

Catalogs may be obtained by writing Dept. BB, Illinois Testing Laboratories, Inc., 420 N. LaSalle St., Chicago 10, Ill.

NELSON STUD-WELDING

A new 36-page brochure, describing a wide variety of applications of high-speed stud-welding, has just been published by the Nelson Sales Corporation, Lorain, Ohio, distributors of Nelson stud-welding guns, and flux-filled studs.

Among the standard and specialized studs illustrated are such types as stay-bolt, lagging, hook, hanger, spacer and step studs, which are applied by the five-pound gun at rates up to 30 per minute, with the total elimination of drilling and tapping. The use of simple masonite and light-gage steel templates making possible tolerances up to .005" is described, as are special production machines for semi-automatic and automatic operation.

Detailed specifications and physical characteristics are also tabulated in the booklet, available on request to Dept. BB, in care of the company.

LUCAS MILLERS & GRINDERS

Machines available from J. L. Lucas & Son comprise the 12-page catalog released by the company. Included are pictures and descriptions of vertical and horizontal milling machines, duplicating machines, radial drills, lathes, boring, drilling and milling machines and grinders. Partial specifications cover dimensions of the various machines listed such as table working surface, range, weight, export weight and cubic feet of milling machines.

Catalog may be obtained from J. L. Lucas & Son, Inc., Bridgeport 5, Conn.

NORBIDE ABRASIVE

The new Norton Company 4-page folder explains that Norbide abrasive is the result of fusion of boric acid glass and petroleum coke at a temperature of 5000 degrees F. At high temperatures and under great pressure, norbide powder is self-bonding and can be molded into shapes for gages, nozzles, dies and other wear-resistant pieces.

It is available in grain or powdered form for lapping operations which have been performed wholly by diamonds heretofore. Norbide abrasive is satisfactory as a substitute for diamond powder in the cutting and polishing of material having a Moh's hardness of 8 or more. It also laps cemented tungsten and tantalum carbide tools and dies. It may be substituted for diamond powder as the finish for wire drawing dies, as well as ripping them.

Readers may obtain catalog from Dept. BB, Norton Co., Worcester 6, Mass.

VARIABLE SPEED TRANSMISSIONS

STANDARD'S
CUB

ALWAYS
THE RIGHT
SPEED



Easily
Adapted

PRICE
\$16.50
F. O. B.
LOS ANGELES

Boosts
Production
25-40%

DRILL PRESS BRACKET \$1.50 EXTRA

★ FEATURES ★

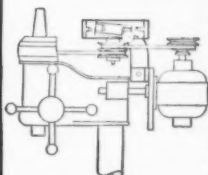
- THOUSANDS OF SPEEDS AVAILABLE
- 3.3 - 1 SPEED RANGE WITH "A" BELTS
- AUTOMATIC, POSITIVE BELT ALIGNMENT
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- SMOOTH-SIDED PULLEYS
- MACHINED CAST IRON CONSTRUCTION
- FULLY GUARANTEED—LOW IN COST

THOUSANDS IN USE

SPEED TABLE

Reduction Ratio*	Mach. Min.	Speed Max.
1-1	1000	3240
1-1.5	666	2160
1-2	500	1620
1-2.5	400	1360
1-3	333	1080
1-3.5	280	920
1-4	250	810

*Reduction ratio between motor pulley and driven pulley. Figures above based on 1600 RPM Motor Speed.



DRILL PRESS APPLICATION

Made in five other sizes. Information on request.

New York, New York—Carl A. Miller & Co.
134 Lafayette St.
Chicago, Illinois—Chicago Pulley & Shafting Co.
17-23 N. Desplaines St.
Houston, Texas—C. P. Williams Co.
2704 W. Dallas Ave.

Standard Trans. Equip. Co.
3407 Verdugo Rd., Los Angeles 41

REVISED CATALOG ON WHEELABRATOR SWING TABLE

A completely revised edition of Catalog No. 214-A which describes the Wheelabrator Swing Table has been published by American Wheelabrator & Equipment Corp., 555 S. Byrkit St., Mishawaka, Ind.

The Wheelabrator Swing Table is an airless abrasive blast cleaning machine that disposes of the slow, high cost, unhygienic disadvantages inherent in air-blast room operation. Equally important is the fact that the machine serves admirably as a versatile, general purpose unit for the shop requiring a single, moderately-priced equipment capable of handling work of a wide variety of shapes, sizes and weights.

Detailed information on each of the five sizes including construction features, overall dimension drawings and specifications is contained in the twenty page catalog. In addition, selections of the profusely illustrated catalog are devoted to operating performance facts, ventilation requirements, installation photographs, list of users and design variations available for handling special cleaning applications.

A copy of Catalog No. 214-A may be obtained from Dept. BB, care of the manufacturer.

CLOVER ABRASIVES

Abrasives is the subject of various pamphlets and booklets published by the Clover Manufacturing Co. One of these, "Coated Abrasives," the story of their manufacture, is 36 pages long. It covers subjects like crude minerals employed, grain grading and heating, trade names, backings, adhesives, machines used in manufacture, coatings, standard packages, specialties, etc.

As a fundamental idea, the booklet stresses the fact that coated abrasives are "real, honest-to-goodness tools" and not just polishing agents. For instance, the wet sanding process, which is important where material being sanded has a tendency to heat quickly and become damaged, calls for "water resistant" abrasive belts. "Wet" sanding is important in sanding glass, some ferrous and non-ferrous metals, lacquer and pigmented surfaces, etc.

Other products are spirally wound abrasive strips, cartridge rolls, moulded discs, etc.

"Coated Abrasives" and other booklets are free on request to Dept. BB, Clover Mfg. Co., Norwalk, Conn.



Interchangeable
A. S. A. STANDARD
PRECISION DRILL JIG BUSHINGS
Speed Up Drilling — Cut Down Costs!
IMMEDIATE DELIVERY of standard sizes and styles from stocks maintained at Garwood, Dayton, Detroit and Stratford • **FREE** color Catalog No. 21 gives standard bushing sizes, together with price list and other information needed by the tool engineer • **Write for it Today.**

REPRESENTATIVES

BIRMINGHAM, VA. M. B. Shiner Richmond 7-7299	ORLANDO, FLA. Charles W. Bringham Telephone 2-3747	DAYTON, OHIO Geo. D. Loughlin Co. Elmhurst 4191	DAVENPORT, IOWA Davenport Engineering Corp. Davenport 2-1991
POUGHKEEPSIE, N. Y. Thomas McCarthy Poughkeepsie 3400	CHICAGO, ILL. Preston Production Tool Co. Arlingheight 3264	DETROIT, MICH. Booth & Shaw Temple 1-4040	*STRAITFORD, CONN. Ellsworth Steel & Supply Co. Bridgeport 7-3317
LOS ANGELES, CALIF. Walter W. Miller Pleasant 3687	*DAYTON, OHIO Geo. D. Loughlin Co. Elmhurst 4191	HOUSTON, TEXAS Clicking Tool & Eng'g Co. W-6-8584	MINNEAPOLIS 2, MINN. Chas. W. Stone Co. Geneva 8531
PHILADELPHIA, PA. Albert R. Dore Delaware 6-3533	*DETROIT, MICH. Booth & Shaw Temple 1-4040	MILWAUKEE 3, WIS. The Stone Company, Inc. Broadway 2452	ROCHESTER, N. Y. Fish Tool Co. Monroe 5679
NEW YORK, N. Y. Carlton Eberhard Wisconsin 7-9192	ST. LOUIS, MO. L. P. Schlicher Main 0150	BOSTON, MASS. M. A. Sargent Co. Garrison 0104	INDIANAPOLIS, IND. General Supply & Tool Corp. Lincoln 8233
PITTSBURGH, PA. The Commonwealth Sales Co. Grant 1362			

*Stock carried at these locations



ACCURATE BUSHING CO.
443 North Ave., GARWOOD, N. J. • Westfield 2-2415

G-E VARNISHES

A 40-page booklet containing complete technical and application data on G-E insulating varnishes has been issued by the Resin and Insulation Materials Division of the General Electric Chemical Department.

The booklet includes specifications, electrical properties, film properties, cure and aging, chemical properties and baking and air drying cycles of each type. Types consist of black baking, black air drying, clear baking, clear air drying, black baking and air drying, clear baking and air drying, sticking varnishes and air drying and baking enamels. Thirty-six grades are described.

To secure booklet, drop card to Dept. BB, General Electric Co., Chemical Dept. Pittsfield, Mass.

BRIGGS REFILLS

Briggs Standard Refills are the subject of a four-page folder, published by The Briggs Filtration Co.

The folder explains how filters keep oil clean of contaminating substances like dust, metallic particles, etc., to which it is

normally subject. Thru frequent changes of refills, the oil will stay clean indefinitely, and instructions are here detailed for just this purpose. Operators are also instructed on the method of changing refills.

The folder may be obtained from Dept. BB, The Briggs Filtration Co., Bethesda 14, Maryland.

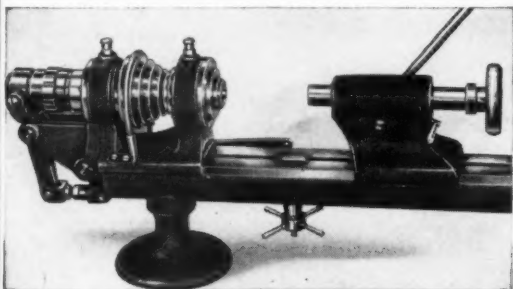
GUTH LIGHTING EQUIPMENT

A new complete catalog has just been announced by The Edwin F. Guth Company of St. Louis. This revised Guth catalog No. 44-A covers the entire Guth line of fluorescent and incandescent lighting equipment, including the latest improvements and new additions. The new Guth catalog contains useful information on lighting design, accurate light-engineering data, with complete details and specifications on all the products listed. Guth catalog No. 44-A is a handy reference volume for everyone interested in lighting; for your copy, write Dept. BB, The Edwin F. Guth Company, 2615 Washington, St. Louis, Mo.

DERBYSHIRE

*Fine Precision
Instrument*

LATHES



FOR INSTRUMENT AND WATCHMAKING

- THREAD CUTTING
- CENTERING
- TURNING
- GRINDING
- DRILLING
- REAMING
- FORMING
- MILLING

• Illustrated • CAPACITY .315" • BED 12" • SWING 3.94"
MAGNUS BALL-BEARING LATHE • COMBINATION TAILSTOCK
SPRING-BIND COLLET CLOSER ATTACHMENT.

F. W. DERBYSHIRE, INC., WALTHAM 54, MASSACHUSETTS

KEYSTONE CARBON POWDER METALLURGY

Keystone Carbon Co., St. Marys, Pa., has just revised and enlarged their powder metallurgy catalog to include many new sizes for their self-lubricating porous bronze bearings. The new sizes are for their plain bearings, flanged bearings, and self-aligning spherical type bearings.

All information from the former catalog on both powdered metal parts and powdered metal bearings has been retained in the revised catalog. Of particular interest is the section devoted to the correct design of powdered metal parts. Copies will be mailed upon request to Dept. BB.

BLITZREV ATTACHMENT

This new bulletin illustrates and describes the Blitzrev Surface Grinder Attachment. The attachment operates a small wheel at high speed on a spindle driven by a belt from a drum pulley, which fits the regular mount of the surface grinder. Thru horizontal and vertical adjustments, the wheel can be used in a wide range of positions. Seven quills are furnished to accommodate wheels of $\frac{1}{8}$ " to $2\frac{1}{2}$ " di-

ameter. Copies of the bulletin are available from Dept. BB, D & S Model Company, 105-23 S. Robert Street, Ludington, Michigan.

WESTINGHOUSE CRANE CONTROL

Five types of a-c magnetic crane controls for handling any type of load are described in a new 20-page booklet announced by the Westinghouse Electric Corporation.

The booklet contains descriptive information, wiring diagrams, performance curves and an application guide to aid in selecting the type of a-c control best suited to any application. Special attention is given to the reactor system, a new development particularly applicable where spotting of the load is important. D-C dynamic, A-C dynamic, counter-torque and reversing-plugging systems are also covered. Installation photographs are included, as well as descriptions and photographs of control panels and associated equipment.

Copies of the new booklet (B-3853) may be secured from Dept. BB, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

Save Time



in **TURNING
MILLING
GRINDING**

WITH

NICHOLSON EXPANDING MANDRELS

Save the time lost in making or looking for solid arbors. Set of 19 Nichol-

son expanding mandrels does the work of 209 solid arbors.

OTHER ADVANTAGES OF THESE WIDELY USED TOOLS

PRECISION—No parts to wear out and cause distortion.

RUGGEDNESS—Sure grip on heavy work.

For all bores, 1" to 7". Hardened stainless steel. Two types, sold singly or in sets. Used in shops the nation over.

Bulletin 1043

W. H. NICHOLSON & CO., 117 Oregon St., Wilkes-Barre, Pa.

Valves • Traps • Floats • Steam Specialties

Shop Hints

CUTTING PLASTIC RODS

By Geo. F. Burnley

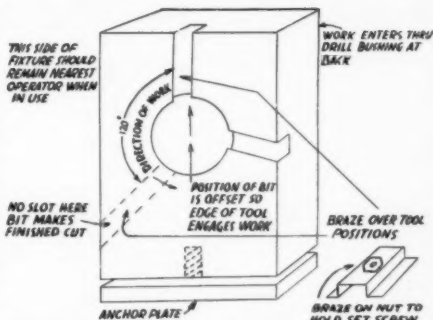
With many new plastics being placed on the market, the average machine shop or plant maintenance department often finds itself called upon to make or duplicate parts from stock with which they are not familiar. A case in point is the replacing of broken plastic reset buttons of several electrical switch boxes.

The unit to be made consisted of a plastic rod $\frac{3}{8}$ " in diameter by 6" long, with a flat head for "pushing," the size of a fifty cent coin and about $\frac{3}{16}$ " thick. Each unit was to be made out of a long bar of brittle black plastic of 1- $\frac{3}{16}$ " in diameter.

On the surface, the job seemed simple enough, but in practice the following difficulties developed. The pressure of the cutting tool caused the stock to whip or bow, making a distinct taper appear at the free end.

Centering the work in the tailstock was useless because the center hole wore away rapidly, and pressure against the hand-wheel (for purposes of compensation) resulted in excessive heat. Even a live center proved unsatisfactory since the final cuts along the middle of the slender brittle piece caused the piece to climb the blade of the tool and snap. The jig sketched, however, handled this and similar work successfully.

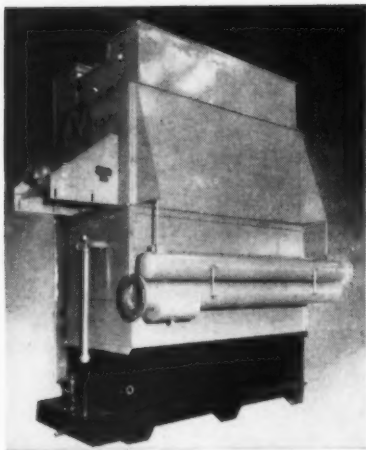
The jig, simply enough, was made of a steel block 3" x 3" x 5". On "chucking" the block, one end was faced squarely and smoothly and a $\frac{1}{2}$ " NCS hole drilled and tapped in the center. Then a small plate was cut to fit in the lathe tool post slot, a $\frac{1}{4}$ " stud was welded in the middle and the job was fastened by this piece securely to the compound rest. After the



ELEVATION VIEW OF PLASTIC ROD CUTTING FIXTURE

block was properly centered by adjusting the cross-slide, a pilot hole was drilled part way through by a drill placed in the lathe spindle. Later the pilot was replaced by a $1\frac{1}{2}$ " drill and in cutting, the work was steadied by bringing the tail stock quill behind it.

This done, the job was removed, placed in a vise, and three positions laid out on it 120° apart to bisect the $1\frac{1}{2}$ " hole to hold the tool bits. The tool bit positions were offset from the exact center of the hole in such a way that the cutting edge engages the work at the correct angle. The work was secured in the shaper and the slot for the top tool bit was cut for $\frac{1}{2}$ the width of the bit. The next slot, preferably the one which would be opposite the operator's working position, was cut to the full depth of the bit. To complete the work on the block, a couple of small "U" shaped clamps were made to be



NIAGARA Aero After Cooler Saves Expensive "Wear-Out" of Air Tools

Water in compressed air lines is more than a nuisance; it costs thousands of dollars yearly in worn-out tools and equipment, or broken air tools caused by water hammer, abrasion and washed-out lubricants.

Protect your air tools and compressed air processes with drier compressed air using the Niagara Aero After Cooler. Always keeps air in compressed air lines below relative surrounding temperature, prevents condensation and provides air with one-third to one-half the moisture content of water-cooled air. Water savings will pay for the installation.

Write for Bulletin 98-MT.

NIAGARA BLOWER COMPANY

Over 30 Years of Service in Air Engineering
405 Lexington Ave., New York 17, N. Y.
Field Engineering Offices in Principal Cities



AIR ENGINEERING EQUIPMENT

brazed over the first and second tool bit positions.

On the third position, since the bit was flush with the block, a flat piece was used and holes were drilled and fitted with screws to maintain the setting of the cutting bits when adjusted. Stout steel nuts brazed over the set screw holes make adequate reinforcement over the comparatively thin metal "U" clamps.

The job complete, a stock drill jig bushing was placed in the block opposite the tool slots, cutting bits, ground, and the jig placed on the compound rest. With a few adjustments of the position and shape of the cutting tools the plastic bar, at high spindle speed, fed through the cutter slowly and the desired effect was easily accomplished, requiring only a slight trimming at the "stepped" base before cutting off.

METHOD OF ATTACHING NUTS REDUCES MANUFACTURING COST

An ingenious yet simple manufacturing process which not only increases the security of attachment of automobile or truck bodies and steering gear assem-

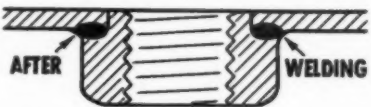
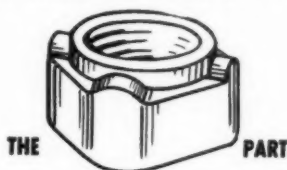


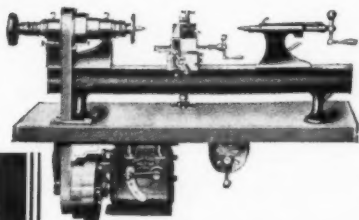
FIG. 1-3

116-706

blies to chassis frames but also reduces manufacturing cost and chance of mis-

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With motor drive unit**

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alignment has been developed by Midland Steel Products Company, Detroit, Mich.

The process consists of projection welding previously threaded nuts to frame side rails. The nuts, shown in the sketch have four projections formed on the attachment side of the head during the forging process. To attach a nut to the frame, it is placed, with projections 'up', in the lower die of the platen of a 100 KVA Progressive Welder Company 3052 E. Outer Drive, Detroit 12, Mich.) press welder. The side rail is slid along, until a registering hole in the channel drops over the shoulder on the nut. The upper platen is brought down, one shot of current is passed through the electrodes, fusing the projections to the side rail and the job is finished.

Advantages over the previous method of either arc welding or mechanically attaching such nuts, are greater security of attachment, accurate alignment, and considerable increase in output, particularly since nuts do not have to be tapped or re-tapped after welding.

Nuts attached to side-rails in this manner range from $\frac{1}{4}$ to $\frac{1}{2}$ inch nominal size, the same Progressive machine being used regardless of size.

Also shown are sketches of the nut and side-rail stock before and after welding. Important, according to Midland officials, is the correct dimensioning of the four projections in relation to the top shoulder, the base of the nut and the thickness of the stock to which it is being projection welded.

NELCO TOOL REDUCES MILLING TIME OF COPPER BLOCK

Nelco Tool Co., Brooklyn 31, N. Y., manufacturers of Carboloy-tipped cutting tools, reports an interesting use of its milling cutter by the I-T-E Circuit Breaker Co., 1900 Hamilton St., Philadelphia, Pa.

I-T-E wished to cut a slot $\frac{1}{2}$ " deep, $5\frac{1}{2}$ " long, .252" wide from hard extruded copper terminal block.

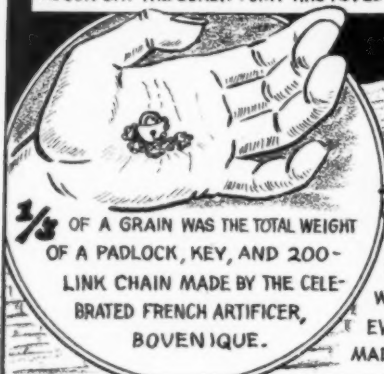
According to Nelco Tool, through the use of its Carboloy-tipped cutters, the actual time required for the operation—including loading and unloading—was reduced from 3.2 hours per 100 slots to 1.4 hours per 100 slots over previous time, and the table feed increased from $5\frac{1}{2}$ " per minute to 90" per minute.

Additionally, 3200 slots are obtained before dulling or loss of size sets in. The Nelco Carboloy-tipped cutters are used in gangs of 2 and sometimes 3, and the pieces are ganged in the fixture in the same manner.

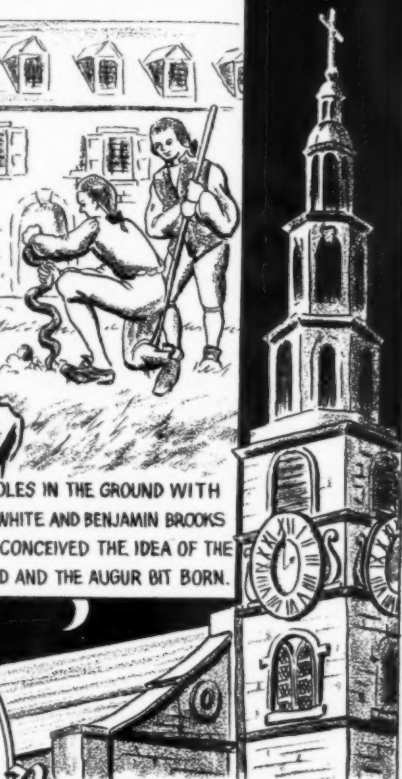
Mechanics Through the Ages



IT WAS WHILE WATCHING BOYS BORING HOLES IN THE GROUND WITH TWISTED HOOP-IRON IN 1774 THAT JOHN WHITE AND BENJAMIN BROOKS OF HAMMER HOLLOW, VALLEY FORGE, PA, CONCEIVED THE IDEA OF THE AUGUR BIT. THE SCREW POINT WAS ADDED AND THE AUGUR BIT BORN.



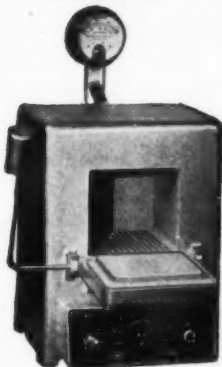
$\frac{1}{3}$ OF A GRAIN WAS THE TOTAL WEIGHT OF A PADLOCK, KEY, AND 200-LINK CHAIN MADE BY THE CELEBRATED FRENCH ARTIFICER, BOVENIQUE.



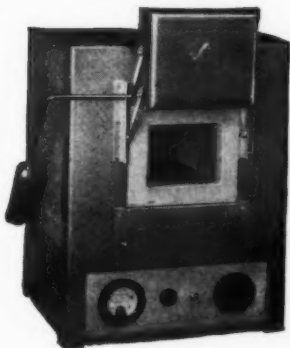
UNTIL THE ESTABLISHMENT OF THE CLOCK-MAKERS GUILD IN 1631, CLOCKS OF LONDON WERE MADE BY BLACKSMITHS WHO BOUGHT THE WOODEN PARTS FROM THE WOODMONGER GUILD. EVEN AS LATE AS 1680, THE BLACKSMITHS MADE THE 'GREAT CHURCH CLOCKS OF IRON.'



MODEL GTP



MODEL CEA



MODEL OFE

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Model GTP—interior 4" x 3 $\frac{3}{4}$ " x 3 $\frac{3}{4}$ ". May be operated continuously up to 1500° F. and intermittently to 1850° F. Embedded heating element. Power consumption 1.2 kw. Cast aluminum body. Weight 15 pounds.

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Also available for 230V and D.C.

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Model OFE—interior 6" x 5" x 10". Maximum temperature 1600° F. continuous, 1900° F. intermittent. Synchronous motor driven control. Heating element covers four sides of chamber. Steel frame with 4 $\frac{1}{2}$ " insulation. Maximum power consumption 2.2 kw. Weight 130 pounds.

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ON STEEL, IRON, BRASS, BRONZE, WOOD,
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Speed with power with precision—that's the new PRECISE 40. Surpasses our own PRECISE 35 which outworked every tool in the field. In strong, light plastic case, PRECISE 40 weighs only 40 oz. —packs a record 1/5 H.P. New type quill mounts precision collet chuck or grinding wheel arbors of various sizes; push-button spindle lock for quick tool change. 90% greater cooling; four oversize ball bearings. Quickly lubricated by pressure gun through ball-valve inlets. Tool mounts in vise, lathe, stand, or milling machine or can be used with PRECISE accessories for special applications. Guaranteed shockproof without ground wire.

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PRECISE 40

G. E.—U. S. ARMY ROCKET MOTOR TEST STATION

A station to static-test rocket propulsion motors up to 50,000-pound thrust, equivalent to 500,000 hp., has been constructed near Schenectady as a part of General Electric-U. S. Army Ordnance Department joint long-range rocket research program.

The test station has three test pits, each of which is divided into four rooms: control room, motor room, and two reactant rooms. Three-foot steel-reinforced concrete walls separate the motor room from the rest of the structure. All other

walls and the roof are two feet in thickness. Heavy steel doors seal off each room when tests are in progress.

The control room, lying parallel to the motor room, contains all the valves and controls used in regulating "runs" of rocket motors under test in the pit.

The motor room is open at the rear for the passage of the rocket motor exhaust flame. The operating stand to which the rocket motor is attached during the test firings is on the forward wall of the motor room. Reactant and cooling water lines are connected to the motor at this point. Mirrors opposite the observation reflect the motor and its exhaust to the observers during the "run." A steel and asbestos box containing a camera is attached to the wall above the observation ports and photographs the rocket exhaust during firing.

One reactant room is directly forward of the motor room. It contains the propellant for the rocket motor, liquid oxygen supplied by a "buggy" connected to a fueling line outside the pit. A thrust bar to record the thrust of the rocket motor during the test is also in this room.

The second reactant room, parallel to the motor room, houses a smaller fabricated and calibrated tank for the alcohol propellant. Both propellant tanks are pressurized from gas bottles housed on the exterior of the pit.

The test station, about a year old, has given much to rocket development.

M.R.E. PROFILE TURNING BOX

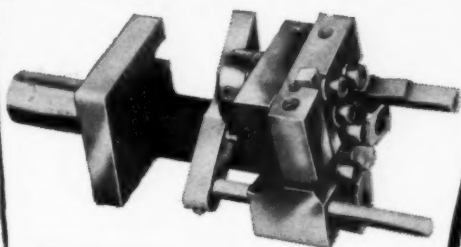
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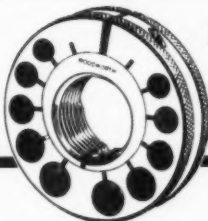
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STANDARDIZATION IN INDUSTRY

Brigadier General Donald Armstrong, Assistant to the Chairman of the Executive Committee of the American Standards Association, addressed the Business Problems School of the Chicago Association of Commerce and Industry recently on the subject of standardization in business and industry.

Armstrong discussed the increasingly important part the American Standards Association is playing in standardization measurements controlled throughout the war by the Government. The Association was formulated by a committee headed

by Charles E. Wilson, President of the General Electric Company. The committee recommended that the American Standards Association be maintained as a fully independent, privately financed agency. Their recommendations were accepted by the Department of Commerce with only minor changes. The Commerce Department's National Bureau of Standards and the American Standards Association work together on occasion. The Bureau is represented on 100 ASA technical committees; Bureau work receives support through the channels of the ASA; ASA has stimulated particular researches at the Bureau and carried out Bureau standards.

According to Gen. Armstrong, the Association itself "is a clearing house for all industries and organizations interested in voluntary standardization. It coordinates the standards for many hundreds of national groups. It does not duplicate the work of any other organization but confines itself to work which these other groups either would not . . . or could not do as effectively by themselves."

It has had over 150 currently existing standards adopted in the country. Safety codes have reduced the number of accidents, saved compensation money and decreased lost time. "Approved mechanical standards cut overhead, reduce capital requirements . . . ease storage problems, result in greater speed and efficiency in purchasing, production, sales."

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FIG. NO. 5 Adjustable type Machinists' Levels with ground and graduated vial. Grooved for use on shafting. Sizes 4", 6", 8", 12", 18".

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FIG. NO. 50—For setup and maintenance is accurate to 10 seconds. Graduations are in .0005" per foot. Packed in Instrument Case.

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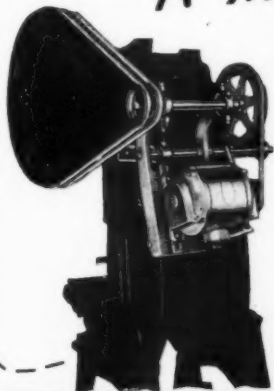
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**MOTOR DRIVE FOR
EVERY MACHINE TOOL**



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Utilizing the jackshaft principle, permitting the use of standard 1750 R.P.M. Motors.

Brackets for direct drive from motor to flywheel are also available from stock.

Write for catalog showing complete line of Modern Drives for other machine tool equipment.

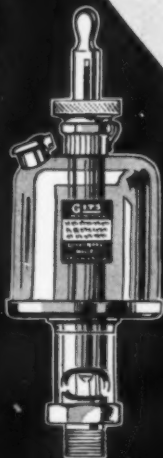
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URGE FREE DEPRECIATION

The International Revenue Department of the United States should allow free depreciation on purchases of machine tools and other productive equipment in order to assist small and medium sized manufacturers in capital financing. This was the suggestion of Herbert H. Pease, President of the National Machine Tool Builders Association and head of The New Britain Machine Co., New Britain, Conn., before a recent meeting of the Association at Atlantic City.

Mr. Pease defined free depreciation as

freedom of a buyer to write off the cost of new productive equipment at the time of purchase or over a schedule of years, at his option. Free depreciation was allowed in Germany in pre-war years and is today allowed in Sweden.

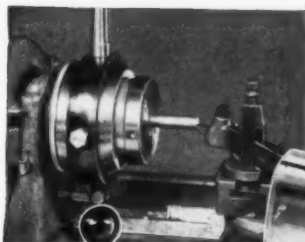
Adoption of this policy would reduce cost and pass on part of the difference in price reductions, because industry would then be encouraged to buy new equipment.

"If depreciation were taken all in one year, the cost to the Government would be only the delay of one year in taxes. There would be a natural brake on the amount a concern would put into new equipment based upon an estimate of the year's income subject to taxes."

Mr. Pease concluded with the statement that prices for goods should be within the means of the customer. Otherwise, prosperity will be turned into a depression. "The

wider use of improved high-production cost-reducing machines is more than ever important to keep our economy on a sound basis."

At the same meeting, a report was also made on the forthcoming Machine Tool Show to be held in Chicago September 17 to 26, by Mr. Swan E. Bergstrom, Chairman of the Show Committee and Sales Manager of The Cincinnati Milling Machine Co. Mr. Bergstrom reported that reservations of exhibit space have exceeded original estimates and the show will occupy well over 500,000 square feet.



New — Levermatic COLLET CHUCK

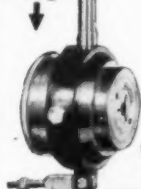
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Production Needs



Selective
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Radically
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- 1-inch capacity specially engineered Forst Collet maintains positive, straight parallel grip on work at all times.



- Hand-operated self-locking selective adjustment ring maintains set predetermined pressures—assures solid grip on work.
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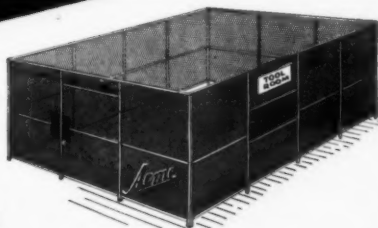
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C-72

THE LEAVITT MACHINE COMPANY ORANGE, MASSACHUSETTS

PRESSED METAL INSTITUTE FIGHTS BLACK MARKET

Specific firm offers of over-priced "black-market" steel sheets and strip aggregating more than a million tons and ranging in price up to \$250 per ton have been reported to the Pressed Metal Institute by its members, according to Tom J. Smith, President of the Institute, speaking at a recent Cleveland District Meeting to more than 180 pressed metal manufacturers.

"The danger inherent in this situation can hardly be overestimated", declared Mr. Smith. "The Pressed Metal Institute

front is now well under way.

"Every possible effort will be made by the Institute during the weeks ahead to assure a sufficient volume of both hot and cold rolled sheet and strip steel to meet the requirements of the pressed metal manufacturers," said Mr. Smith in conclusion. "Adequate supply of steel is the only factor in the outlook of the industry for 1947 which does not augur a year of the largest production of stampings in the history of the industry." C. A. Rooke, Chairman of the Cleveland District of the Pressed Metal Institute presided at the meeting.

will continue its determined campaigns, in cooperation with the Iron and Steel Institute and with government departments, for the return of foreign battlefield scrap and against (1) black market steel, (2) high prices for scrap, (3) withdrawal of hot rolled steel from sale, and (4) exchange of billets for scrap.

"Since early February, when the Institute's campaign was initiated, scrap prices have fallen approximately ten dollars per ton and offerings of black market steel have been lessened to some extent," Mr. Smith pointed out. "Further, the Institute's activity to facilitate the return of foreign scrap has focussed widespread attention on the importance of this problem; Congress and the State Department are now cognizant of this situation and have indicated that corrective steps will be taken. Organized effort to get action on this

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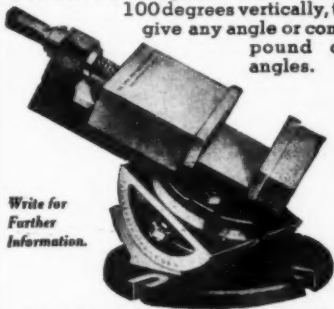
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Swivels 360 degrees horizontally,
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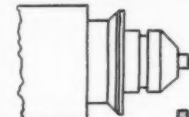


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WHY USE
SEVERAL
TOOLS
WHEN ONE
WILL DO
THE JOB

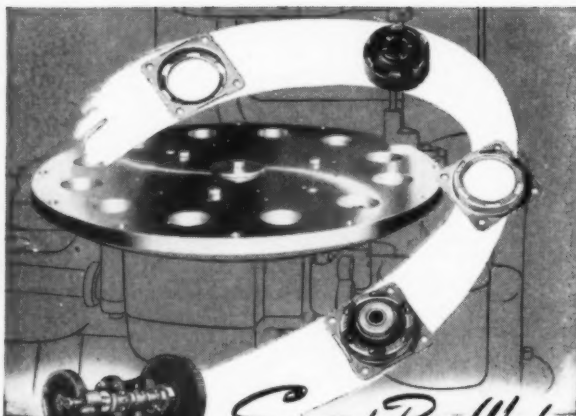
FORM GROUND CARBIDE AND HIGH SPEED TOOL BITS

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79 NEWBRIDGE ROAD



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URGES DESIGN FOR RESISTANCE WELDING

A criticism of his own industry in failing to supply design engineers with adequate information as to how to "design for resistance welding" was voiced at a recent meeting of the Detroit Section, Society of Automotive Engineers, Rackham Engineering Building, Detroit, by John D. Gordon, General Manager, Progressive Welder Co., Detroit.

"In the automotive industry," Mr. Gordon said, "there is little appreciation of what can be done toward reducing costs thru resistance welding—and designing

for such welding—except among the specialists in such processes in various plants.

"It is in the design stage," Mr. Gordon pointed out, "that the manufacturing costs of such things as automobile bodies are largely controlled. Exterior appearance of the body can remain completely unchanged."

As an example of the potential influence of correct process engineering in the "design" stage, Mr. Gordon cited an example of one automobile body. Originally this body was laid out to be assembled with four right and four left hand fixtures at a cost of \$272,000. A number of changes in details of construction reduced the cost to \$125,200.

"The advantage to be derived from such process engineering is not confined to major products," Gordon pointed out. On one part "process engineering" saved \$2000 in equipment and released one man for other work. On another group of small parts which his company was asked to process—engineer, the cost of equipment was reduced \$12,000.

In one part a simple change—just widening one flange slightly at one point—resulted in an equipment saving of \$36,000. On another job, cost was reduced \$40,000 plus a reduction in floor space which, at current cost of \$7.50 per sq. ft. amounted to \$12,000.

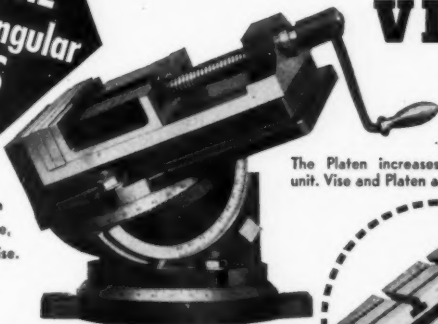
"Design and manufacturing changes," Gordon emphasized, "must be of such a nature as to reduce operator effort.

SAVE TIME
on intricate, angular
SET-UPS

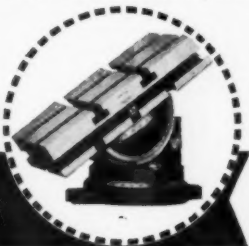
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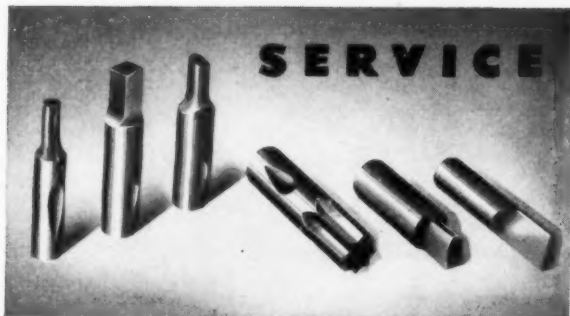


The Platen increases capacity of the
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50,000 MILES OF STREET LIGHTING NEEDED TO RELIGHT AMERICA

Dr. A. F. Dickerson, manager of the General Electric's Lighting Division, told members of the Southeastern Electrical Exchange recently that ten years and 50,000 miles of street lighting are required to "relight America."

Dickerson said that immediate action is needed to provide adequate traffic safety lighting on U. S. streets and highways.

"Today two persons are killed at night to one in daylight, although the traffic is only one-third as great," he said. "Only

lighting can turn the night curve downward."

Cost of lighting the streets and highways was estimated by Dickerson at half a billion dollars. He stated that since 1911 other municipal services have increased from 200 to 300 percent, but street lighting expenditures had remained the same.

"Me a nwhile, traffic deaths have increased twenty-five fold," he said. "We cannot afford not to spend more for adequate street lighting."

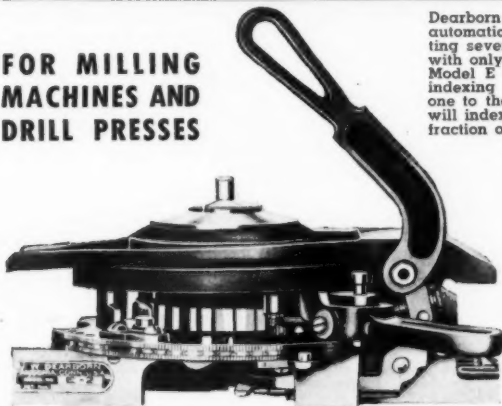
Less than two per cent of the municipal tax dollar now goes for street lighting, according to Dickerson. Citing the case of New Jersey, he indicated that state aid may be the solution to the problem. The State of New Jersey pays the private utility companies for a 2500 lumen lamp in a modern luminaire for each 200 feet of state designated highway within the corporate limits of towns, villages and cities. Light in excess of

that paid for by the State is borne by the local community. The State wholly finances continuous highway and intersection lighting outside of urban limits.

Dr. Dickerson pointed out that the new edition of the Illuminating Engineering Society's Recommended Practice of Street Lighting is rapidly becoming the accepted standard of street lighting practice in most cities. In the I.E.S. Code, pendant luminaires are specified exclusively because they provide from two to three times as much light on the pavement as the commonly used upright globes and lanterns.

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**MANAGEMENT'S PLEDGES TO INVESTORS,
CUSTOMERS, EMPLOYEES**

Speaking before the Baltimore Personnel Association at the Lord Baltimore Hotel, General Brehon Somervell, President of Koppers Co., Inc., asserted that management "must prove its ability to provide a stable economy that is satisfactory to the people as a whole" or see the American system of free enterprise replaced.

General Somervell headed the U. S. Army Service Forces during World War II. He became President of Koppers last May 1, following his retirement from the Army.

To accomplish these objectives, General Somervell recommended that management must establish and carry out a firm philosophy of business in its application to the employees, the customers and the investors.

"The real heart of the problem," he declared, "is in defining a philosophy, breaking it down into actual statements of policy, reducing those policy statements to specific plans which have procedures, techniques, and controls to assure absolutely that the original philosophy is being applied on a day-to-day basis."

Simply stated, the speaker said management must make the following pledges to the three groups most interested in its conduct.

To the investors: good business judgment, good management, and an honest effort by all.

To the customers: good products at fair prices and a continued appreciation of their confidence.

To the employees: fair and equal treatment of all persons; a sound basis of payment for services rendered; a real respect for opinions and individual problems; appreciation of, and recognition for ability, skill and training; and understanding of the individual employee's dependence upon the group as a whole for his and his company's future.

Among policies set up to insure its pledges to employees, he listed those of giving equal pay for equal work; adherence to rates of pay that compare favorably with similar job rates of other companies in the area, etc.

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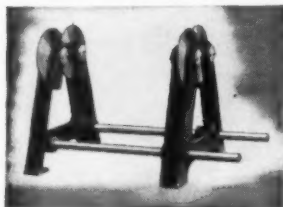


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EVERLASTING FASTENINGS

PHOTOGRAPHY AIDS MACHINE-TOOL DESIGNERS

High-speed photographic studies of cutting tools reveal that a rake angle of approximately 24 degrees is more efficient than a more acute one when machining steel, L. T. Weller of General Electric's Apparatus Manufacturing Department told delegates attending the recent ASTE meeting in St. Louis.

At the 24-degree angle, the chip is rolled up with less crushing action and the chip flow is much smoother, according to Weller.

Determination of efficient rake angle

is only one of the advantages accruing from such photographic studies, he said.

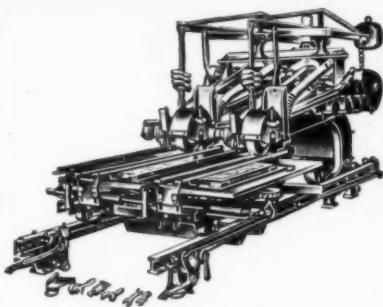
"The use of high-speed photography has enabled those interested in the efficiency of metal-cutting operations to learn what happens when metal meets the cutting edge of a cutting tool.

"In addition to showing the effect of various coolants on chip flow and the influence the speed of cutting has on chip flow, the use of photography produces much data of considerable value to designers and machine-tool development specialists."

In one experiment, planing and milling machines were used to cut cast iron, brass, and mild steel, and the chip action, as it was influenced by rake and clearance angles, was observed to determine an optimum working condition as well as to find any irregular action resulting from improperly ground tools.

Before the test, Mr. Weller reported, squares 1/32 inch apart were inscribed on the flock of metal being processed. The shape of these figures after the test was an indication of the degree of chip compression. Results of this test show that the degree of rake angle determines the kind of compression which results.

When machining steel, a rake angle of 16 degrees crushes the chip, and the squares marked on the test piece take the shape of oblongs. With the 24-degree angle, however, the marked areas remained in approximately their original shape and the chip action smoother.

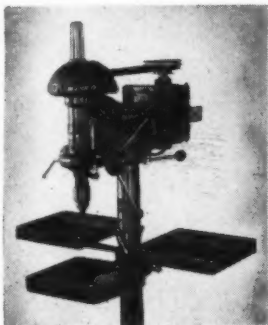


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TOP GOVERNMENT SECRET REVEALED: "SILENT DEATH" CAN NOW BE STOPPED

Thousands of people die of carbon monoxide poisoning each year. By the use of a gadget developed and manufactured during the war by the National Bureau of Standards, many lives can be saved. The N. B. S. Carbon Monoxide Indicator, a sensitive instrument, is used for "the rapid determination of infinitesimal" amounts of carbon monoxide in the air. The detector is about the size of a pencil and was used extensively during the war to detect poisonous fumes in plane cockpits,

etc. The Indicator will detect and closely estimate less than one part of carbon monoxide per 500 million parts of air, which allows a big safety factor because it takes about one part of carbon monoxide in 10,000 parts of air to affect the human system. Field use requires only a small inexpensive apparatus without maintenance problems, and involves procedures so simple that untrained personnel can obtain reliable results.

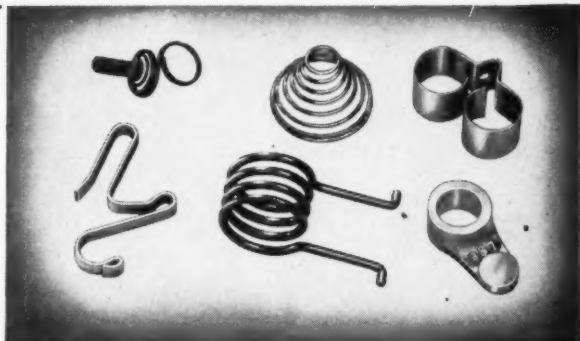
The detector consists of a small glass tube sealed at both ends and a rubber bulb all packed into a small kit that fits into the pocket. When the presence of monoxide is suspected, the kit can be opened, the tip broken off a small tube and one end inserted in the bulb to draw air samples through the chemicals in the tube.

If carbon monoxide is present, the yellow chemicals will turn green in thirty seconds.

The darker the shade of green, the higher the monoxide concentration. A matching color chart tells how high the concentration is.

This new gadget will be useful in cockpits and cabins of airplanes, cabins of gasoline propelled boats, in busses and cabs of motor transports, refineries, mines, or wherever carbon monoxide fumes might be expected. The United States Safety Service Co., 1215 McGee St., Kansas City, Mo., has been licensed by the government to manufacture the instrument, and will be in production on the item within the next few months.

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Milling Machines

SCIENTISTS SEEK JET ENGINE SECRETS IN "BOMB-PROOF" DUGOUT

In a "bomb-proof" dugout at the Westinghouse Research Laboratories scientists soon will begin to explode whirling, red-hot disks of metal in an effort to determine the maximum strength of parts for aircraft jet engines.

Disks of specially-developed alloys, one foot in diameter and one inch thick, will be heated to temperatures above 1,400 degrees Fahrenheit and spun at a speed of 1,200 miles per hour—35,000 rpm—until they fly apart.

The disks will be placed in the center

of a dugout, ringed with heavy sandbags and attached to the shaft of an ultra-high speed motor located 10 feet below the "dugout" floor.

Electric heating coils provide the high temperatures required. During testing, the 32-pound disks are covered by thin steel hoods from which air has been evacuated to reduce friction. The hoods are constructed of 1/8-inch steel, so that flying fragments of the metal will easily penetrate them.

As the heated disk spins, research engineers will make continuous measurement of its temperature. Methods for doing this posed a difficult problem. Since the disk is whirling at the rate of 35,000 rpm, any thermocouple attached to the outer rim would have a centrifugal pull of approximately 190,000 times its own weight and would have to be fastened strongly enough to resist a pull of many thousand pounds. The problem was solved by a special welding process.

Periodic measurements also will be made of the expanding diameter of the whirling metal disk. Under high stress and temperature, all metals tend to creep, and with the very narrow clearances in the gas turbine, a knowledge of this rate of creep is vital. The scientists plan to chart a behavior pattern for alloys. Such knowledge of the physical limitations of metals will be valuable both in designing present aviation gas turbines and in pointing the way to the development of new and stronger alloys.

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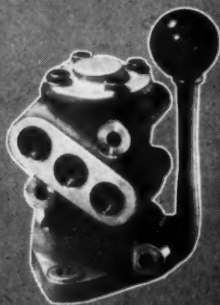
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BY-PRODUCTS TO BE USED BEFORE ATOMIC POWER

The by-products of atomic energy may well prove of greater importance to society than atomic power itself, delegates to the "World Conference on Mineral Resources" were told. The conference was held recently at Hotel Waldorf Astoria, New York City, in connection with the seventy-fifth annual meeting of the American Institute of Mining and Metallurgical Engineers.

These by-products include radioactive isotopes, radiation chemistry and metallurgy, and fission products, "and we

indicated that the first real commercial application of atomic energy may take the form of power plants for ships, and mining and metallurgical industries have several special reasons for being interested in the atomic age. The latter industries will aid in producing special materials required by atomic energy installations and processes, will adapt atomic power to the mining and refining of materials, and will find radioactive isotopes and radiation in metal and chemical processes of value for laboratory study and production. Institute members may handle much atomic research.

shall probably realize many of their benefits more quickly" than those of atomic power produced commercially, according to a paper prepared by Harry A. Winne, General Electric vice president in charge of engineering policy, and B. R. Prentice, his assistant on atomic energy matters.

Discussing "Applications of Atomic energy to Industry," Mr. Winne, who presented the paper, said that the production of commercially useful atomic power was technically possible, and that experimental or demonstration plants would be in operation within the next two to four years.

"We believe such production is economically feasible, at least for many special applications . . . However, the development of economically competitive atomic power is in our estimation a long-term project, possibly requiring decades."

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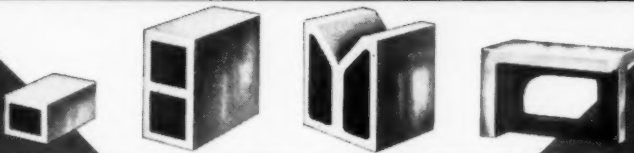
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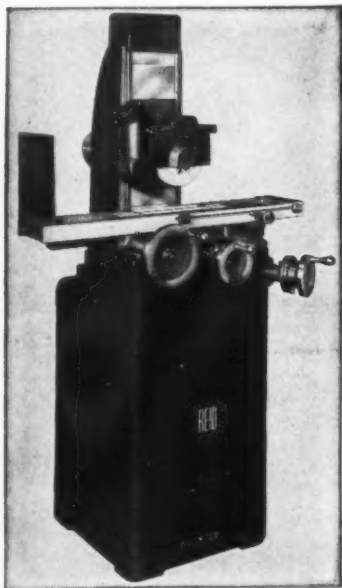
THE CHALLENGE MACHINERY COMPANY

MAIN OFFICE AND FACTORY: GRAND HAVEN, MICH.

REID HAND FEED SURFACE GRINDER

Reid Brothers Co. have introduced a new model, designated as No. 48, to their line of Hand Feed Precision Surface Grinders. This machine is designed to supply manufacturers with the demand for a grinder for smaller work, assuring close tolerance and high finish on tools, gages, dies, etc.

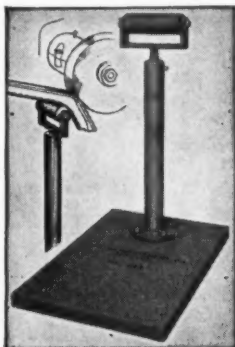
The machine grinds work 4" x 8" x 9½" high from the work table. It elevates



12½" from the work table to the center of the spindle, which is a ¾ hp motorized frictionless type, attaining a speed of 3450 rpm. Its controls are accurately graduated to .0005" for the elevating hand wheel, and to .001 for the cross feed hand wheel. The grinder weighs approximately 900 lbs., and displaces a floor area of 56" wide (allowing for table travel on each side, is 36" from front to back, and 66½" high. Further information will be furnished by writing to the Reid Brothers Co. Inc., Dept. BB, Beverly, Mass.

WORK SUPPORT ROLLER

Ease and increased speed in polishing unusually long or extra heavy pieces is provided by the Presto Work Supporting Roller. The unit consists of a rubber roller, 8½" long x 3" in diameter, mounted on a large portable base. The height adjustment is from 32" to 40" on an upright



standard connected to the base. The accessory affords a quick set-up for polishing oversize material. Complete information will be supplied by writing to the manufacturer, the Manderscheid Co., Dept. 107, 810 Fulton St., Chicago 7, Ill.

UNIFORM JOINTS OBTAINED ON AUTOMATIC BRAZING MACHINE

Stronger and more uniform joints are consistently obtained by automatic control of heat-pattern and heat-time, fuel supply and assembly pressure, in a new brazing machine engineered and manufactured by the Selas Corporation of America, Philadelphia 34, Pa. Designed specifically for a brass sink fixture, the machine completes the brazing operation within 30 seconds. Three stations are provided for operation in a loading, heating and cooling sequence.

The component parts with alloy rings preplaced are fluxed and positioned in a supporting jig. Air pressure is applied to assure close contact of all parts during the heating and cooling cycles. As the burners are brought to brazing position a solenoid valve opens the gas-air mixture line to "full on." A timer releases burners at the end of the heating cycle, to a retracted position and cuts fuel supply to maintain a pilot condition.

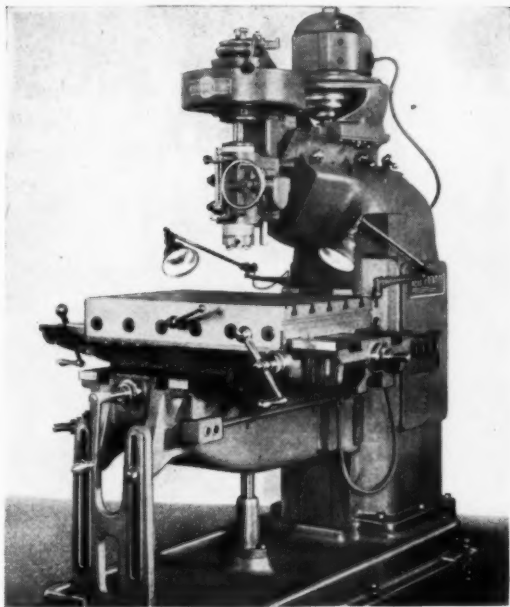
VERTICAL MILLER WITH ADJUSTABLE RAM

Reed-Prentice Corp. has developed a new, heavy-duty milling machine suitable for high-speed milling, routing, and die sinking work. Its versatile range recommends it for work on plastic and rubber molds, die casting dies, and forge dies.

The head is mounted on the horizontal ram, assuring a wider range forward and back; the spindle construction is also rigid, with an open belt range of ten speeds, 400 to 2600 rpm, and a range of five speeds by using the back gears of from 133 to 320 rpm. The machine is actuated by a V-belt drive to assure smooth operation at high speed; the power is from a 3 hp, 1200 rpm, 60 cycle motor, also mounted on the ram.

The work table is 32" x 22" x 4"; the longitudinal feed of the milling machine is 27", with a cross-feed of 20", and a 16" vertical adjustment of the knee. An additional advantage of this unit is the comparatively limited amount of floor space which it requires—100" x 60", with a height of 90".

Also available are attachments, includ-



ing power feed, motor driven pump and piping, hand or power feed rotary table, and a universal angle plate. Further information will be supplied by writing to the Reed-Prentice Corp., Worcester 4, Mass.

GOODYEAR DEVELOPS GLASS FIBER HOSE

A weapon for fighting stubborn refinery and oil well fires with live steam was announced here today in a revolutionary type of industrial hose developed by Goodyear Tire & Rubber Co. The new type steam hose employs spun glass yarn as a basic component to gain maximum heat resistance. Capable of carrying 200 pounds of saturated steam at 388 degrees Fahrenheit for more than 300 hours under continuous flexing, it is said the new glass fiber hose will greatly increase the steam volume used in smothering oil fires such as recently devastated Texas City. This amount of pressure would char and burst ordinary hose,

which has a fabric carcass and is seldom recommended for steam pressure exceeding 100 pounds.

In the development stage for several years, chief difficulty in perfecting the hose was getting a glass cord capable of withstanding maximum flexing required in steam service. A bonding technique developed by Goodyear during the war is used to achieve high adhesive strength between the hose's glass carcass, rubber tube and cover.

The new hose is designed also for heavy-duty steam or hydraulic service in foundries, and other industrial plants. The glass cord is made by the Owens-Corning Fiberglass Corp., Toledo, Ohio.

YOU'LL FIND IT HERE!

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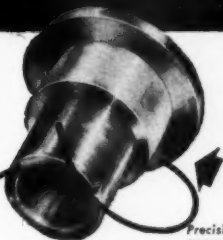
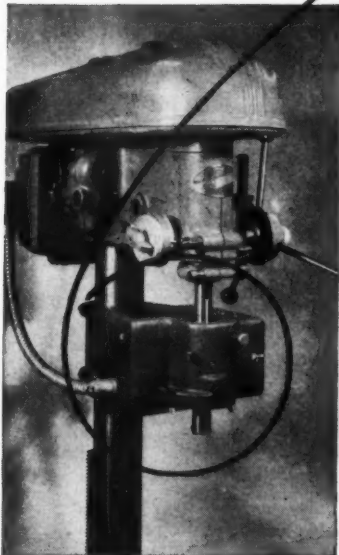
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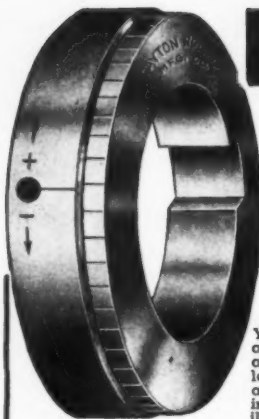
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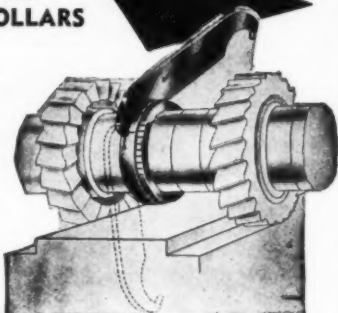
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Diameter	SIDE CHIP CLEARANCE		Our Net Price
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3	1/16	1	\$3.66
3	3/32	1	3.60
3	1/8	1	3.60
3	5/32	1	3.66
4	1/16	1	4.74
4	3/32	1	4.74
4	1/8	1	4.86
4	5/32	1	4.98
4	3/16	1	5.16
5	1/16	1	6.06
5	3/32	1	6.06
5	1/8	1	6.24
5	5/32	1	6.42
5	3/16	1	6.72
6	1/16	1	7.86
6	1/8	1—1 1/4	7.86
6	3/16	1—1 1/4	8.88
8	3/32	1 1/4	16.14
8	1/8	1—1 1/4	16.14
8	3/16	1 1/4	17.40
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3	3/16	1	4.68
4	3/16	1	6.48
5	3/16	1	8.40
5	1/4	1	8.88
6	3/16	1—1 1/4	11.10
6	1/4	1—1 1/4	11.34
8	3/16	1 1/4	21.78
8	1/4	1 1/4	22.44

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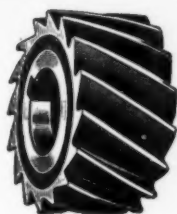
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Diameter Inches	Face Inches	Hole Inches	Our Net Price Each
2	1/4	1/2	\$2.65
2	3/8	5/8	2.77
2	1/4	7/8	3.02
2 1/2	1/4	7/8	3.40
2 1/2	3/8	7/8	3.59
2 1/2	1/2	7/8	3.78
2 1/2	1/2	7/8	4.15
3	1/4	1	4.15
3	3/8	1	4.10
3	1/2	1	4.35
3	3/4	1	4.54
3	1	1	4.79
4	1/2	1	5.04
4	3/4	1	5.67
4	1	1	5.67
4	1 1/4	1	6.36
4	1 1/2	1	6.36
4	1 3/4	1	7.12
4	2	1	7.12
4	2 1/4	1	7.75
4	2 1/2	1	7.75
4	2 3/4	1	8.38
4	3	1	9.00
5	1 1/4	1	9.00
5	1 1/2	1	9.00
5	1 3/4	1	9.00
5	2	1	9.55
5	2 1/4	1	9.51
5	2 1/2	1	10.52
5	2 3/4	1	11.46
5	3	1	13.42
5	3 1/4	1 or 1 1/4	13.42
6	1 1/4	1	11.00
6	1 1/2	1	11.00
6	1 3/4	1	11.00
6	2	1	11.00
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6	2 1/2	1	12.41
6	2 3/4	1	13.92
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7	1 1/2	1 or 1 1/4	18.00
7	1 3/4	1 or 1 1/4	18.00
7	2	1 or 1 1/4	21.67
7	2 1/4	1 or 1 1/4	25.39
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8	2	1 or 1 1/4	28.00
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2 1/4	1 1/2	3/8	\$ 2.84
2 1/4	1	3/8	3.78
2 1/2	1 1/4	1	1.95
2 1/2	1 1/4	1	2.58
2 1/2	1 1/4	1	2.71
2 1/2	3/8	1	2.90
2 1/2	1 1/2	1	3.09
2 1/2	3/4	1	3.21
2 1/2	1 1/2	1	3.53
2 1/2	1 1/2	1	3.78
2 1/2	1 1/2	1	4.35
2 1/2	2	1	5.42
2 1/2	2 1/2	1	6.49
2 1/2	3	1	7.62
3	1 1/4	1	8.63
3	1 1/4	1	2.39
3	1 1/4	1	3.15
3	3/8	1	3.40
3	3/8	1	3.59
3	1 1/2	1 or 1 1/4	3.78
3	3/4	1 or 1 1/4	4.03
3	7/8	1 or 1 1/4	4.35
3	1 1/4	1 or 1 1/4	4.73
3	1 1/2	1 or 1 1/4	5.10
3	1 1/2	1 1/4	5.48
3	2	1 1/4	6.24
3	3	1 1/4	6.83
4	7/32	1 1/4	8.44
4	1/4	1 1/4	11.40
4	9/32	1	3.55
4	1 1/4	1	4.47
4	1 1/2	1	3.85
4	3/8	1	4.85
4	1/2	1 or 1 1/4	5.16
4	5/8	1 or 1 1/4	5.86
4	3/4	1 or 1 1/4	6.43
4	1 1/2	1 1/4	7.06
4	2	1 1/4	8.25
4	3	1 1/4	10.77
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Dykem Co.	346

Eastern Tool Supply Co.	298
Economy Engineering Co.	208
Economy Mch. Products Co.	222
Economy Tool & Machine Co.	304
Edroy Products Co.	260
Elaser Engineering Co.	245
Electrolyzed Tap Corp.	28
Elgin Tool Works.	219
Elliott Mfg. Co.	299
Empire Tool Co.	77
Enco Manufacturing Co.	114
Engineer's Specialty Co.	103
Errington Mechanical Laboratory	303
Ex-Cell-O Corp., (Continental)	198
Excelsior Tool & Machine Co.	381

Fakes & Co., Jos. B.	202
Fanco Machine Co.	285
Federal Foundry Supply Co.	351
Federal Press Co.	374
Fellows Gear Shaper Co.	221
Fenn Mfg. Co.	94
Fitchburg Grinding Mch. Corp.	17
Flexrock Company	315
Ford Motor Co. (Johansson Div.)	227
Fostoria Pressed Steel Corp.	24
Fray Machine Tool Co.	328
Fulfilo Specialties Co.	32

Gallmeyer & Livingston Co.	163
General Die & Stamping Co.	376
General Eng. & Mfg. Co.	43
Giddings & Lewis Machine Tool Co.	36-37
Gilman Engineering & Mfg. Corp.	279
Gisholt Machine Co.	2
Gits Brothers Mfg. Co.	376
Glenzer Co., J. C.	217
Gorton Machine Co., Geo.	145
Gorvo-Nelson Company	92
Graham Mfg. Co.	254
Grant Mfg. & Machine Co.	322
Gray-Mills Corp.	350
Greaves Machine Tool Co.	260
Greeneard Arbor Press Co.	335
Greenlee Bros. & Co.	23
Grob Brothers	346
Grobet File Co. of America	359-345
Gruen Gauge Company	220

Hall Level & Mfg. Wks.	369
Hall Mfg. Co.	258
Hamilton Tool Co.	314
Hammond Machinery Builders	34-270
Han-Dee Spring & Mfg. Co.	383
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Harper Co., H. M.	380
Hart Machine Co.	297
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Harvey Mfg. Co.	387
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